NEC

# N8406-022A 1Gb Intelligent L2 Switch

## Command Reference Guide (AOS)

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# Command line interface

## Introduction

The 1Gb Intelligent L2 Switch is ready to perform basic switching functions right out of the box. Some of the more advanced features, however, require some administrative configuration before they can be used effectively.

The extensive switching software included in the switch provides a variety of options for accessing and configuring the switch:

- Built-in, text-based command line interfaces (AOS CLI and ISCLI) for access via a local terminal or remote Telnet/Secure Shell (SSH) session
- Simple Network Management Protocol (SNMP) support for access through network management software such as NEC WebSAM NetvisorPro
- A browser-based management interface for interactive network access through the Web browser

The command line interface is the most direct method for collecting switch information and performing switch configuration. Using a basic terminal, you can view information and statistics about the switch, and perform any necessary configuration.

This guide describes how to use and configure on the Layer2 switch mode of the switch. For the information to configure on the SmartPanel mode, see the SmartPanel Referece Guide.

This chapter explains how to access the AOS CLI to the switch.

## Additional references

Additional information about installing and configuring the switch is available in the following guides, which are attached in this product.

- *N8406-022A 1Gb Intelligent L2 Switch User's Guide*
- *N8406-022A 1Gb Intelligent L2 Switch Application Guide*
- *N8406-022A 1Gb Intelligent L2 Switch Command Reference Guide (ISCLI)*
- *N8406-022A 1Gb Intelligent L2 Switch Browser-based Interface Reference Guide*
- *N8406-022A 1Gb Intelligent L2 Switch SmartPanel Reference Guide*

## Connecting to the switch

You can access the command line interface in one of the following ways:

- Using a console connection via the console port
- Using a Telnet connection over the network
- Using a Secure Shell (SSH) connection to securely log in over a network

### Establishing a console connection

To establish a console connection with the switch, you need:

- A null modem cable with a female DB-9 connector (See the *User's Guide* for more information.)
- An ASCII terminal or a computer running terminal emulation software set to the parameters shown in the table below

Table 1 Console configuration parameters

| Parameter | Value |
|---|---|
| Baud Rate | 9600 |
| Data Bits | 8 |
| Parity | None |
| Stop Bits | 1 |
| Flow Control | None |

To establish a console connection with the switch:

1. Connect the terminal to the console port using the null modem cable.
2. Power on the terminal.
3. Press the Enter key a few times on the terminal to establish the connection.
4. You will be required to enter a password for access to the switch. (For more information, see the “Setting passwords” section in the “First-time configuration” chapter.)

## Setting an IP address

To access the switch via a Telnet or an SSH connection, you need to have an Internet Protocol (IP) address set for the switch. The switch can get its IP address in one of the following ways:

- Management port access:
  - Using a Dynamic Host Control Protocol (DHCP) server—When the `/cfg/sys/dhcp` command is `enabled`, the management interface (interface 256) requests its IP address from a DHCP server. The default value for the `/cfg/sys/dhcp` command is `enabled`.
  - Configuring manually—If the network does not support DHCP, you must configure the management interface (interface 256) with an IP address. If you want to access the switch from a remote network, you also must configure the management gateway (gateway 4).
- Uplink port access:
  - Using a Bootstrap Protocol (BOOTP) server—By default, the management interface is set up to request its IP address from a BOOTP server. If you have a BOOTP server on the network, add the Media Access Control (MAC) address of the switch to the BOOTP configuration file located on the BOOTP server. The MAC address can be found in the System Information menu (See the “System information” section in the “Information Menu” chapter.) If you are using a DHCP server that also does BOOTP, you do not have to configure the MAC address.
  - Configuring manually—If the network does not support BOOTP, you must configure the management port with an IP address.

## Establishing a Telnet connection

A Telnet connection offers the convenience of accessing the switch from any workstation connected to the network. Telnet provides the same options for user, operator, and administrator access as those available through the console port. By default, Telnet is enabled on the switch. The switch supports four concurrent Telnet connections.

Once the IP parameters are configured, you can access the CLI using a Telnet connection. To establish a Telnet connection with the switch, run the Telnet program on the workstation and enter the telnet command, followed by the switch IP address:

```
telnet <1Gb Intelligent L2 Switch IP address>
```

You will then be prompted to enter a password. The password entered determines the access level: administrator, operator, or user. See the “Accessing the switch” section later in this chapter for description of default passwords.

## Establishing an SSH connection

Although a remote network administrator can manage the configuration of a switch via Telnet, this method does not provide a secure connection. The Secure Shell (SSH) protocol enables you to securely log into the switch over the network.

As a secure alternative to using Telnet to manage switch configuration, SSH ensures that all data sent over the network is encrypted and secure. In order to use SSH, you must first configure it on the switch. See the “Secure Shell Server configuration” section in the “Configuration Menu” chapter for information on how to configure SSH.

The switch can perform only one session of key/cipher generation at a time. Therefore, an SSH/Secure Copy (SCP) client will not be able to log in if the switch is performing key generation at that time or if another client has just logged in before this client. Similarly, the system will fail to perform the key generation if an SSH/SCP client is logging in at that time.

The supported SSH encryption and authentication methods are listed below.

- Server Host Authentication—Client RSA authenticates the switch in the beginning of every connection
- Key Exchange—RSA
- Encryption:
  - AES256-CBC
  - AES192-CBC
  - AES128-CBC
  - 3DES-CBC
  - 3DES
  - ARCFOUR
- User Authentication—Local password authentication; Remote Authentication Dial-in User Service (RADIUS)

The following SSH clients are supported:

- SSH 3.0.1 for Linux (freeware)
- SecureCRT® 4.1.8 (VanDyke Technologies, Inc.)
- OpenSSH_3.9 for Linux (FC 3)
- SCP commands for Linux (FC3)
- PuTTY Release 0.58 (Simon Tatham) for Windows

NOTE: The switch implementation of SSH is based on versions 1.5 and 2.0, and supports SSH clients from version 1.0 through version 2.0. SSH clients of other versions are not supported. You may configure the client software to use protocol SSH version 1 or version 2.

By default, SSH service is not enabled on the switch. Once the IP parameters are configured, you can access the command line interface to enable SSH.

To establish an SSH connection with the switch, run the SSH program on the workstation by issuing the ssh command, followed by the user account name and the switch IP address:

```
>> # ssh <user>@<1Gb Intelligent L2 Switch IP address>
```

You will then be prompted to enter your password.

NOTE: The first time you run SSH from the workstation, a warning message might appear. At the prompt, enter yes to continue.

# Accessing the switch

To enable better switch management and user accountability, the switch provides different levels or classes of user access. Levels of access to the CLI and Web management functions and screens increase as needed to perform various switch management tasks. The three levels of access are:

- User—User interaction with the switch is completely passive; nothing can be changed on the switch. Users may display information that has no security or privacy implications, such as switch statistics and current operational state information.
- Operator—Operators can only effect temporary changes on the switch. These changes will be lost when the switch is rebooted/reset. Operators have access to the switch management features used for daily switch operations. Because any changes an operator makes are undone by a reset of the switch, operators cannot severely impact switch operation, but do have access to the Maintenance menu.
- Administrator—Only administrators can make permanent changes to the switch configuration, changes that are persistent across a reboot/reset of the switch. Administrators can access switch functions to configure and troubleshoot problems on the switch. Because administrators can also make temporary (operator-level) changes as well, they must be aware of the interactions between temporary and permanent changes.

Access to switch functions is controlled through the use of unique usernames and passwords. Once you are connected to the switch via the local console, Telnet, or SSH, you are prompted to enter a password. The password entered determines the access level. The default user names/password for each access level is listed in the following table.

NOTE: It is recommended that you change default switch passwords after initial configuration and as regularly as required under your network security policies. For more information, see the “Setting passwords” section in the “First-time configuration” chapter.

Table 2 User access levels

| User account | Description and tasks performed |
|---|---|
| User | The user has no direct responsibility for switch management. He or she can view all switch status information and statistics, but cannot make any configuration changes to the switch. The user account is enabled by default, and the default password is `user`. |
| Oper | The operator manages all functions of the switch. The operator can reset ports or the entire switch. By default, the operator account is disabled and has no password. |
| Admin | The super user administrator has complete access to all menus, information, and configuration commands on the switch, including the ability to change both the user and administrator passwords. The admin account is enabled by default, and the default password is `admin`. |

NOTE: With the exception of the admin user, setting the password to an empty value can disable access to each user level.

Once you enter the administrator password and it is verified, you are given complete access to the switch.

After logging in, the Main Menu of the CLI is displayed. See the “Menu basics” chapter for a summary of the Main Menu options.

```
[Main Menu]
      info    - Information Menu
      stats   - Statistics Menu
      cfg     - Configuration Menu
      oper    - Operations Command Menu
      boot    - Boot Options Menu
      maint   - Maintenance Menu
      diff    - Show pending config changes  [global command]
      apply   - Apply pending config changes [global command]
      save    - Save updated config to FLASH [global command]
      revert  - Revert pending or applied changes [global command]
      exit    - Exit  [global command, always available]

>> Main#
```

# Idle timeout

By default, the switch will disconnect the console, Telnet, or SSH session after five minutes of inactivity. This function is controlled by the idle timeout parameter, which can be set from 1 to 60 minutes. For information on changing this parameter, see the “System configuration” section in the “Configuration Menu” chapter.

# Typographical conventions

The following table describes the typographic styles used in this guide:

Table 3 Typographic conventions

| Typeface or symbol | Meaning | Example |
|---|---|---|
| `AaBbCc123` | This type depicts onscreen computer output and prompts. | `Main#` |
| `AaBbCc123` | This type displays in command examples and shows text that must be typed in exactly as shown. | `Main# sys` |
| *<AaBbCc123>* | This italicized type displays in command examples as a parameter placeholder. Replace the indicated text with the appropriate real name or value when using the command. Do not type the brackets. This also shows guide titles, special terms, or words to be emphasized. | To establish a Telnet session, enter: `host# telnet <IP address>`<br><br>Read the user guide thoroughly. |
| `[ ]` | Command items shown inside brackets are optional and can be used or excluded as the situation demands. Do not type the brackets. | `host# ls [-a]` |

# Menu basics

## Introduction

The AOS CLI is used for viewing switch information and statistics. In addition, the administrator can use the CLI for performing all levels of switch configuration.

To make the CLI easy to use, the various commands have been logically grouped into a series of menus and submenus. Each menu displays a list of commands and/or submenus that are available, along with a summary of what each command will do. Below each menu is a prompt where you can enter any command appropriate to the current menu.

This chapter describes the Main Menu commands, and provides a list of commands and shortcuts that are commonly available from all the menus within the CLI.

## Main Menu

The Main Menu displays after a successful connection and login. The following table shows the Main Menu for the administrator login. Some features are not available under the user login.

```
[Main Menu]
      info    - Information Menu
      stats   - Statistics Menu
      cfg     - Configuration Menu
      oper    - Operations Command Menu
      boot    - Boot Options Menu
      maint   - Maintenance Menu
      diff    - Show pending config changes  [global command]
      apply   - Apply pending config changes [global command]
      save    - Save updated config to FLASH [global command]
      revert  - Revert pending or applied changes [global command]
      exit    - Exit  [global command, always available]
```

## Menu summary

The Main Menu displays the following submenus:

- Information Menu

  The Information Menu provides submenus for displaying information about the current status of the switch: from basic system settings to VLANs, and more.

- Statistics Menu

  This menu provides submenus for displaying switch performance statistics. Included are port, IP, ICMP, TCP, UDP, SNMP, routing, ARP, and DNS.

- Configuration Menu

  This menu is available only from an administrator login. It includes submenus for configuring every aspect of the switch. Changes to configuration are not active until explicitly applied. Changes can be saved to flash memory.

- Operations Command Menu

  Operations-level commands are used for making immediate and temporary changes to switch configuration. This menu is used for bringing ports temporarily in and out of service. This menu is available only from an administrator and operator login.

- Boot Options Menu

  The Boot Options Menu is available only from an administrator login. This menu is used for upgrading switch software, selecting configuration blocks, and for resetting the switch when necessary. This menu is also used to set the switch back to factory settings.

- Maintenance Menu

  This menu is used for debugging purposes, enabling you to generate a technical support dump of the critical state information in the switch, and to clear entries in the Forwarding Database and the Address Resolution Protocol (ARP) and routing tables. This menu is available only from an administrator and operator login.

# Global commands

Some basic commands are recognized throughout the menu hierarchy. These commands are useful for obtaining online Help, navigating through menus, and for applying and saving configuration changes.

For help on a specific command, type help. The following screen displays:

```
Global Commands: [can be issued from any menu]
help              up                print             pwd
lines             verbose           exit              quit
diff              apply             save              revert
ping              traceroute        telnet            history
pushd             popd              who

The following are used to navigate the menu structure:
   .  Print current menu
  ..  Move up one menu level
   /  Top menu if first, or command separator
   !  Execute command from history
```

The following table describes the global commands.

Table 4 Global commands

| Command | Action |
|---|---|
| `?` command or `help` | Provides usage information about a specific command on the current menu. When used without the command parameter, a summary of the global commands is displayed. |
| `.` or `print` | Displays the current menu. |
| `..` or `up` | Moves up one level in the menu structure. |
| `/` | If placed at the beginning of a command, displays the Main Menu. Otherwise, this is used to separate multiple commands placed on the same line. |
| `lines` | Sets the number of lines (n) that display on the screen at one time. The default is 24 lines. When used without a value, the current setting is displayed. |
| `diff` | Shows any pending configuration changes that have not been applied.<br>`diff flash` displays all pending configuration changes that have been applied but not saved to flash memory, as well as those that have not been applied. |
| `apply` | Applies pending configuration changes. |
| `save` | Saves the active configuration to backup, and saves the current configuration as active.<br>`save n` saves the current configuration as active, without saving the active configuration to backup. |
| `revert` | Removes changes that have been made, but not applied.<br>`revert apply` removes all changes that have not been saved. |
| `exit` or `quit` | Exits from the command line interface and logs out. |
| `ping` | Verifies station-to-station connectivity across the network. The format is:<br>`ping` *<host name>* \| *<IP address>* [ *<number of tries>* [ *<msec delay>* ]]<br>• IP address is the hostname or IP address of the device.<br>• number of tries (optional) is the number of attempts (1-32).<br>• msec delay (optional) is the number of milliseconds between attempts. |
| `traceroute` | Identifies the route used for station-to-station connectivity across the network. The format is:<br>`traceroute` *<host name>* \| *<IP address>* [*<max-hops>* [ *<msec delay>* ]]<br>• IP address is the hostname or IP address of the target station.<br>• max-hops (optional) is the maximum distance to trace (1-16 devices)<br>• msec delay (optional) is the number of milliseconds to wait for the response. |
| `pwd` | Displays the command path used to reach the current menu. |
| `verbose n` | Sets the level of information displayed on the screen:<br>• 0 = Quiet: Nothing displays except errors, not even prompts.<br>• 1 = Normal: Prompts and requested output are shown, but no menus.<br>• 2 = Verbose: Everything is shown. This is the default.<br>• When used without a value, the current setting is displayed. |
| `telnet` | This command is used to Telnet out of the switch. The format is:<br>`telnet` *<hostname>* \| *<IP address>* [port] |
| `history` | Displays the history of the last ten commands. |

Table 4 Global commands

| Command | Action |
|---|---|
| pushd | Remembers the current location in the directory of menu commands. |
| popd | Returns to the last pushd location. |
| who | Displays users who are logged in. |

# Command line history and editing

Using the command line interface, you can retrieve and modify previously entered commands with just a few keystrokes. The following options are available globally at the command line:

Table 5 Command line history and editing options

| Option | Description |
|---|---|
| history | Displays a numbered list of the last ten previously entered commands. |
| !! | Repeats the last entered command. |
| !n | Repeats the nth command shown on the history list. |
| <Ctrl-p> or Up arrow key | Recalls the previous command from the history list. This can be used multiple times to work backward through the last ten commands. The recalled command can be entered as is, or edited using the options below. |
| <Ctrl-n> or Down arrow key | Recalls the next command from the history list. This can be used multiple times to work forward through the last ten commands. The recalled command can be entered as is, or edited using the options below. |
| <Ctrl-a> | Moves the cursor to the beginning of the command line. |
| <Ctrl-e> | Moves cursor to the end of the command line. |
| <Ctrl-b> or Left arrow key | Moves the cursor back one position to the left. |
| <Ctrl-f> or Right arrow key | Moves the cursor forward one position to the right. |
| <Backspace> or Delete key | Erases one character to the left of the cursor position. |
| <Ctrl-d> | Deletes one character at the cursor position. |
| <Ctrl-k> | Erases all characters from the cursor position to the end of the command line. |
| <Ctrl-l> | Redisplays the current line. |
| <Ctrl-u> | Clears the entire line. |
| Other keys | Inserts new characters at the cursor position. |
| . | Prints the current level menu list. |
| .. | Moves to the previous directory level. |

# Command line interface shortcuts

The following shortcuts allow you to enter commands quickly and easily.

## Command stacking

As a shortcut, you can type multiple commands on a single line, separated by forward slashes (/). You can connect as many commands as required to access the menu option that you want.

For example, the keyboard shortcut to access the Simple Network Management Protocol (SNMP) Configuration Menu from the Main# prompt is:

```
Main# cfg/sys/ssnmp/name
```

## Command abbreviation

Most commands can be abbreviated by entering the first characters that distinguish the command from the others in the same menu or submenu.

For example, the command shown above could also be entered as:

```
Main# c/sys/ssn/n
```

## Tab completion

By entering the first letter of a command at any menu prompt and pressing the Tab key, the CLI will display all commands or options in that menu that begin with that letter. Entering additional letters will further refine the list of commands or options displayed.

If only one command fits the input text when the Tab key is pressed, that command will be supplied on the command line, waiting to be entered. If the Tab key is pressed without any input on the command line, the currently active menu displays.

# First-time configuration

## Introduction

This chapter describes how to perform first-time configuration and how to change system passwords.

To begin first-time configuration of the switch, perform the following steps.

1. Connect to the switch console. After connecting, the login prompt displays.

```
  Blade Network Technologies 1Gb Intelligent L2 Switch.


Enter password:
```

2. Enter `admin` as the default administrator password.

   The system displays the Main Menu with administrator privileges.

```
[Main Menu]
   info    - Information Menu
   stats   - Statistics Menu
   cfg     - Configuration Menu
   oper    - Operations Command Menu
   boot    - Boot Options Menu
   maint   - Maintenance Menu
   diff    - Show pending config changes  [global command]
   apply   - Apply pending config changes [global command]
   save    - Save updated config to FLASH [global command]
   revert  - Revert pending or applied changes [global command]
   exit    - Exit  [global command, always available]

>> Main#
```

3. From the Main Menu, enter the following command to access the Configuration Menu:

```
Main# /cfg
```

   The Configuration Menu is displayed.

```
[Configuration Menu]
     sys       - System-wide Parameter Menu
     port      - Port Menu
     l2        - Layer 2 Menu
     l3        - Layer 3 Menu
     rmon      - RMON Menu
     pmirr     - Port Mirroring Menu
     ufd       - Uplink Failure Detection Menu
     dump      - Dump current configuration to script file
     ptcfg     - Backup current configuration to FTP/TFTP server
     gtcfg     - Restore current configuration from FTP/TFTP server
     cur       - Display current configuration
```

## Configuring Simple Network Management Protocol support

NOTE: SNMP support is enabled by default.

1. Use the following command to enable SNMP:

```
>> # /cfg/sys/access/snmp disable|read only|read/write
```

2. Set SNMP read or write community string. By default, they are public and private respectively:

```
>> # /cfg/sys/ssnmp/rcomm|wcomm
```

3. When prompted, enter the proper community string.

4. Apply and save configuration if you are not configuring the switch with Telnet support. Otherwise apply and save after the performing the “Optional Setup for Telnet Support” steps.

```
>> System# apply

>> System# save
```

# Setting passwords

NEC recommends that you change all passwords after initial configuration and as regularly as required under the network security policies. See the “Accessing the switch” section in the “Command line interface” chapter for a description of the user access levels.

To change the user, operator, or administrator password, you must log in using the administrator password. Passwords cannot be modified from the user or operator command mode.

NOTE: You must not forget your administrator password. If you forget your administrator password, contact your service representative.

## Changing the default administrator password

The administrator has complete access to all menus, information, and configuration commands, including the ability to change the user, operator, and administrator passwords.

The default password for the administrator account is admin. To change the default password:

1. Connect to the switch and log in using the `admin` password.
2. From the Main Menu, use the following command to access the Configuration Menu:

```
Main# /cfg
```

The Configuration Menu is displayed.

```
[Configuration Menu]
     sys      - System-wide Parameter Menu
     port     - Port Menu
     l2       - Layer 2 Menu
     l3       - Layer 3 Menu
     rmon     - RMON Menu
     pmirr    - Port Mirroring Menu
     ufd      - Uplink Failure Detection Menu
     dump     - Dump current configuration to script file
     ptcfg    - Backup current configuration to FTP/TFTP server
     gtcfg    - Restore current configuration from FTP/TFTP server
     cur      - Display current system access configuration
```

3. From the Configuration Menu, use the following command to select the System Menu:

```
>> Configuration# sys
```

The System Menu is displayed.

```
[System Menu]
     syslog   - Syslog Menu
     sshd     - SSH Server Menu
     radius   - RADIUS Authentication Menu
     tacacs+  - TACACS+ Authentication Menu
     ntp      - NTP Server Menu
     ssnmp    - System SNMP Menu
     access   - System Access Menu
     date     - Set system date
     time     - Set system time
     timezone - Set system timezone (daylight savings)
     olddst   - Set system DST for US
     idle     - Set timeout for idle CLI sessions
     notice   - Set login notice
     bannr    - Set login banner
     hprompt  - Enable/disable display hostname (sysName) in CLI prompt
     bootp    - Enable/disable use of BOOTP
     dhcp     - Enable/disable use of DHCP on Mgmt interface
     reminders - Enable/disable Reminders
     cur      - Display current system-wide parameters
```

4. Enter the following command to set the administrator password:

```
System# access/user/admpw
```

5. Enter the current administrator password at the prompt:

```
Changing ADMINISTRATOR password; validation required...

Enter current administrator password:
```

NOTE: You must not forget your administrator password. If you forget your administrator password, contact your service representative.

6. Enter the new administrator password at the prompt:

```
Enter new administrator password:
```

7. Enter the new administrator password, again, at the prompt:

```
Re-enter new administrator password:
```

8. Apply and save the change by entering the following commands:

```
System# apply
System# save
```

## Changing the default user password

The user login has limited control of the switch. Through a user account, you can view switch information and statistics, but you cannot make configuration changes.

The default password for the user account is user. This password cannot be changed from the user account. Only the administrator has the ability to change passwords, as shown in the following procedure.

1. Connect to the switch and log in using the admin password.
2. From the Main Menu, use the following command to access the Configuration Menu:

```
Main# cfg
```

3. From the Configuration Menu, use the following command to select the System Menu:

```
>> Configuration# sys
```

4. Enter the following command to set the user password:

```
System# access/user/usrpw
```

5. Enter the current administrator password at the prompt.

   Only the administrator can change the user password. Entering the administrator password confirms your authority.

```
Changing USER password; validation required...

Enter current administrator password:
```

6. Enter the new user password at the prompt:

```
Enter new user password:
```

7. Enter the new user password, again, at the prompt:

```
Re-enter new user password:
```

8. Apply and save the changes:

```
System# apply
System# save
```

## Changing the default operator password

The operator manages all functions of the switch. The operator can reset ports or the entire switch. Operators can only effect temporary changes on the switch. These changes will be lost when the switch is rebooted/reset. Operators have access to the switch management features used for daily switch operations. Because any changes an operator makes are undone by a reset of the switch, operators cannot severely impact switch operation.

By default, the operator account is disabled and has no password. This password cannot be changed from the operator account. Only the administrator has the ability to change passwords, as shown in the following procedure.

1. Connect to the switch and log in using the admin password.
2. From the Main Menu, use the following command to access the Configuration Menu:

```
Main# cfg
```

3. From the Configuration Menu, use the following command to select the System Menu:

```
>> Configuration# sys
```

4. Enter the following command to set the operator password:

```
System# access/user/opw
```

5. Enter the current administrator password at the prompt.

   Only the administrator can change the user password. Entering the administrator password confirms your authority.

```
Changing OPERATOR password; validation required...
Enter current administrator password:
```

6. Enter the new operator password at the prompt:

```
Enter new operator password:
```

7. Enter the new operator password, again, at the prompt:

```
Re-enter new operator password:
```

8. Apply and save the changes:

```
System# apply
System# save
```

# Information Menu

## Introduction

You can view configuration information for the switch in the user, operator, and administrator command modes. This chapter discusses how to use the CLI to display switch information.

## Menu overview

Command: `/info`

```
[Information Menu]
     sys      - System Information Menu
     l2       - Layer 2 Information Menu
     l3       - Layer 3 Information Menu
     rmon     - Show RMON information
     link     - Show link status
     port     - Show port information
     geaport  - Show system port and gea port mapping
     ufd      - Show Uplink Failure Detection information
     dump     - Dump all information
```

The following table describes the Information Menu options.

Table 6 Information Menu options

| Command | Usage |
|---|---|
| `sys` | Displays system information. |
| `l2` | Displays the Layer 2 Information Menu. |
| `l3` | Displays the Layer 3 Information Menu. |
| `rmon` | Displays the Remote Monitoring Information Menu. |
| `link` | Displays configuration information about each port, including:<br>• Port number<br>• Port speed (10 Mb/s, 100 Mb/s, 1000 Mb/s, or any)<br>• Duplex mode (half, full, or any)<br>• Flow control for transmit and receive (no, yes, or any)<br>• Link status (up or down) |
| `port` | Displays port status information, including:<br>• Port number<br>• Whether the port uses VLAN tagging or not<br>• Port VLAN ID (PVID)<br>• Port name<br>• VLAN membership |
| `geaport` | Displays GEA port mapping information, used by service personnel. |
| `ufd` | Displays Uplink Failure Detection information |
| `dump` | Dumps all switch information available from the Information Menu (10K or more, depending on your configuration).<br>If you want to capture dump data to a file, set your communication software on your workstation to capture session data prior to issuing the dump commands. |

# System Information Menu

Command: `/info/sys`

```
[System Menu]
     snmpv3   - SNMPv3 Information Menu
     general  - Show general system information
     log      - Show last 100 syslog messages
     user     - Show current user status
     dump     - Dump all system information
```

The following table describes the System Information Menu options.

Table 7 System Information Menu options

| Command | Usage |
|---|---|
| `snmpv3` | Displays the SNMP v3 Menu. |
| `general` | Displays system information, including:<br>• System date and time<br>• Switch model name and number<br>• Switch name and location<br>• MAC address of the switch management processor<br>• IP address of IP interface<br>• Hardware version and part number<br>• Software image file and version number<br>• Configuration name<br>• Log-in banner, if one is configured |
| `log` | Displays 100 most recent syslog messages. |
| `user` | Displays the User Access Information Menu. |
| `dump` | Dumps all switch information available from the Information Menu (10K or more, depending on your configuration). |

# SNMPv3 Information Menu

Command: `/info/sys/snmpv3`

```
[SNMPv3 Information Menu]
     usm      - Show usmUser table information
     view     - Show vacmViewTreeFamily table information
     access   - Show vacmAccess table information
     group    - Show vacmSecurityToGroup table information
     comm     - Show community table information
     taddr    - Show targetAddr table information
     tparam   - Show targetParams table information
     notify   - Show notify table information
     dump     - Show all SNMPv3 information
```

SNMP version 3 (SNMPv3) is an extensible SNMP Framework that supplements the SNMPv2 Framework by supporting the following:

- a new SNMP message format
- security for messages
- access control
- remote configuration of SNMP parameters

For more details on the SNMPv3 architecture, see RFC2271 to RFC2276.

The following table describes the SNMPv3 Information Menu options.

Table 8 SNMPv3 Information Menu options

| Command | Usage |
|---|---|
| usm | Displays User Security Model (USM) table information. |
| view | Displays information about view name, subtrees, mask and type of view. |
| access | Displays View-based Access Control information. |
| group | Displays information about the group that includes the security model, user name, and group name. |
| comm | Displays information about the community table. |
| taddr | Displays the Target Address table. |
| tparam | Displays the Target parameters table. |
| notify | Displays the Notify table. |
| dump | Displays all the SNMPv3 information. |

## SNMPv3 USM User Table information

Command: `/info/sys/snmpv3/usm`

```
usmUser Table:
User Name                       Protocol
------------------------------- -------------------------------
adminmd5                        HMAC_MD5, DES PRIVACY
adminsha                        HMAC_SHA, DES PRIVACY
v1v2only                        NO AUTH,  NO PRIVACY
```

The User-based Security Model (USM) in SNMPv3 provides security services such as authentication and privacy of messages. This security model makes use of a defined set of user identities displayed in the USM user table. The USM user table contains information like:

- the user name
- a security name in the form of a string whose format is independent of the Security Model
- an authentication protocol, which is an indication that the messages sent on behalf of the user can be authenticated
- the privacy protocol.

The following table describes the SNMPv3 User Table information.

Table 9 SNMPv3 User Table parameters

| Field | Description |
|---|---|
| User Name | This is a string that represents the name of the user that you can use to access the switch. |
| Protocol | This indicates whether messages sent on behalf of this user are protected from disclosure using a privacy protocol. switch software supports DES algorithm for privacy. The software also supports two authentication algorithms: MD5 and HMAC-SHA. |

## SNMPv3 View Table information

Command: `/info/sys/snmpv3/view`

```
View Name          Subtree                          Mask           Type
------------------ -------------------------------  -------------  --------
iso                  1                                            included
v1v2only             1                                            included
v1v2only             1.3.6.1.6.3.15                               excluded
v1v2only             1.3.6.1.6.3.16                               excluded
v1v2only             1.3.6.1.6.3.18                               excluded
```

The user can control and restrict the access allowed to a group to only a subset of the management information in the management domain that the group can access within each context by specifying the group's rights in terms of a particular MIB view for security reasons.

The following table describes the SNMPv3 View Table information.

Table 10 SNMPv3 View Table parameters

| Field | Description |
|---|---|
| `View Name` | Displays the name of the view. |
| `Subtree` | Displays the MIB subtree as an OID string. A view subtree is the set of all MIB object instances which have a common Object Identifier prefix to their names. |
| `Mask` | Displays the bit mask. |
| `Type` | Displays whether a family of view subtrees is included or excluded from the MIB view. |

## SNMPv3 Access Table information

Command: `/info/sys/snmpv3/access`

```
Group Name  Model   Level         ReadV     WriteV   NotifyV
----------  ------- ------------ --------- -------- -------
v1v2grp     snmpv1  noAuthNoPriv iso         iso     v1v2only
admingrp    usm     authPriv     iso         iso     iso
```

The access control sub system provides authorization services.

The vacmAccessTable maps a group name, security information, a context, and a message type, which could be the read or write type of operation or notification into a MIB view.

The View-based Access Control Model defines a set of services that an application can use for checking access rights of a group. This group's access rights are determined by a read-view, a write-view, and a notify-view. The read-view represents the set of object instances authorized for the group while reading the objects. The write-view represents the set of object instances authorized for the group when writing objects. The notify-view represents the set of object instances authorized for the group when sending a notification.

The following table describes the SNMPv3 Access Table information.

Table 11 SNMPv3 Access Table parameters

| Field | Description |
|---|---|
| `Group Name` | Displays the name of group. |
| `Model` | Displays the security model used, for example, SNMPv1, or SNMPv2 or USM. |
| `Level` | Displays the minimum level of security required to gain rights of access. For example, noAuthNoPriv, authNoPriv, or auth-Priv. |
| `ReadV` | Displays the MIB view to which this entry authorizes the read access. |
| `WriteV` | Displays the MIB view to which this entry authorizes the write access. |
| `NotifyV` | Displays the Notify view to which this entry authorizes the notify access. |

## SNMPv3 Group Table information

Command: `/info/sys/snmpv3/group`

```
Sec Model  User Name                       Group Name
---------- ------------------------------  --------------------------------
snmpv1     v1v2only                        v1v2grp
usm        adminmd5                        admingrp
usm        adminsha                        admingrp
```

A group is a combination of security model and security name that defines the access rights assigned to all the security names belonging to that group. The group is identified by a group name.

The following table describes the SNMPv3 Group Table information.

Table 12 SNMPv3 Group Table parameters

| Field | Description |
|---|---|
| `Sec Model` | Displays the security model used, which is any one of: USM, SNMPv1, SNMPv2, and SNMPv3. |
| `User Name` | Displays the name for the user. |
| `Group Name` | Displays the access name of the group. |

## SNMPv3 Community Table information

Command: `/info/sys/snmpv3/comm`

```
Index      Name       User Name           Tag
---------- ---------- ------------------- ----------
trap1      public     v1v2only            v1v2trap
```

This command displays the community table information stored in the SNMP engine.

The following table describes the SNMPv3 Community Table information.

Table 13 SNMPv3 Community Table parameters

| Field | Description |
|---|---|
| `Index` | Displays the unique index value of a row in this table. |
| `Name` | Displays the community string, which represents the configuration. |
| `User Name` | Displays the User Security Model (USM) user name. |
| `Tag` | Displays the community tag. This tag specifies a set of transport endpoints from which a command responder application accepts management requests and to which a command responder application sends an SNMP trap. |

## SNMPv3 Target Address Table information

Command: `/info/sys/snmpv3/taddr`

```
Name       Transport Addr  Port Taglist    Params
---------- --------------- ---- ---------- ---------------
trap1      47.81.25.66     162  v1v2trap   v1v2param
```

This command displays the SNMPv3 target address table information, which is stored in the SNMP engine.

The following table describes the SNMPv3 Target Address Table information.

Table 14 SNMPv3 Target Address Table parameters

| Field | Description |
|---|---|
| `Name` | Displays the locally arbitrary, but unique identifier associated with this snmpTargetAddrEntry. |
| `Transport Addr` | Displays the transport addresses. |
| `Port` | Displays the SNMP UDP port number. |
| `Taglist` | This column contains a list of tag values which are used to select target addresses for a particular SNMP message. |
| `Params` | The value of this object identifies an entry in the snmpTargetParamsTable. The identified entry contains SNMP parameters to be used when generating messages to be sent to this transport address. |

## SNMPv3 Target Parameters Table information

Command: `/info/sys/snmpv3/tparam`

```
Name                MP Model User Name            Sec Model Sec Level
------------------- -------- -------------------- --------- -----------
v1v2param           snmpv2c  v1v2only             snmpv1    noAuthNoPriv
```

The following table describes the SNMPv3 Target Parameters Table information.

Table 15 SNMPv3 Target Parameters Table

| Field | Description |
|---|---|
| `Name` | Displays the locally arbitrary, but unique identifier associated with this snmpTargeParamsEntry. |
| `MP Model` | Displays the Message Processing Model used when generating SNMP messages using this entry. |
| `User Name` | Displays the securityName, which identifies the entry on whose behalf SNMP messages will be generated using this entry. |
| `Sec Model` | Displays the security model used when generating SNMP messages using this entry. The system may choose to return an inconsistentValue error if an attempt is made to set this variable to a value for a security model which the system does not support. |
| `Sec Level` | Displays the level of security used when generating SNMP messages using this entry. |

## SNMPv3 Notify Table information

Command: `/info/sys/snmpv3/notify`

```
Name                Tag
------------------- -------------------
v1v2trap            v1v2trap
```

The following table describes the SNMPv3 Notify Table information.

Table 16 SNMPv3 Notify Table

| Field | Description |
|---|---|
| `Name` | The locally arbitrary, but unique identifier associated with this snmpNotifyEntry. |
| `Tag` | This represents a single tag value which is used to select entries in the `snmpTargetAddrTable`. Any entry in the `snmpTargetAddrTable` that contains a tag value equal to the value of this entry is selected. If this entry contains a value of zero length, no entries are selected. |

## SNMPv3 dump

Command: `/info/sys/snmpv3/dump`

```
Engine ID = 80:00:07:50:03:00:0F:6A:F8:EF:00
usmUser Table:
User Name                       Protocol
------------------------------- -------------------------------
admin                           NO AUTH, NO PRIVACY
adminmd5                        HMAC_MD5, DES PRIVACY
adminsha                        HMAC_SHA, DES PRIVACY
v1v2only                        NO AUTH, NO PRIVACY

vacmAccess Table:
Group Name Model   Level        ReadV   WriteV   NotifyV
---------- ------- ------------ ------- -------- ------
admin      usm     noAuthNoPriv org     org      org
v1v2grp    snmpv1  noAuthNoPriv org     org      v1v2only
admingrp   usm     authPriv     org     org      org

vacmViewTreeFamily Table:
View Name            Subtree         Mask         Type
-------------------- --------------- ------------ --------------
org                  1.3                          included
v1v2only             1.3                          included
v1v2only             1.3.6.1.6.3.15               excluded
v1v2only             1.3.6.1.6.3.16               excluded
v1v2only             1.3.6.1.6.3.18               excluded

vacmSecurityToGroup Table:
Sec Model  User Name                       Group Name
---------- ------------------------------ ----------------------
snmpv1     v1v2only                       v1v2grp
usm        admin                          admin
usm        adminsha                       admingrp

snmpCommunity Table:
Index      Name       User Name           Tag
---------- ---------- ------------------- ----------

snmpNotify Table:
Name                Tag
------------------- -------------------

snmpTargetAddr Table:
Name       Transport Addr  Port Taglist    Params
---------- --------------- ---- ---------- ---------------

snmpTargetParams Table:
Name                MP Model User Name          Sec Model Sec Level
------------------- -------- ------------------ --------- -------
```

# System information

Command: `/info/sys/gen`

```
System Information at  6:56:22 Thu Jan 11, 2006
Time zone: Asia/Tokyo

Blade Network Technologies 1Gb Intelligent L2 Switch
sysName:
sysLocation:
RackId: NEC01A 6X00125
RackName: Default_Rack_Name
EnclosureSerialNumber: NEC01A 6X00125
EnclosureName: Default_Chassis_Name
BayNumber:  1

Switch is up 0 days, 14 hours, 56 minutes and 22 seconds.
Last boot reason: reset from console

MAC address: 00:10:00:01:00:01    IP (If 1) address: 10.14.4.16
Revision:
Switch Serial No:
Hardware Part No:                 Spare Part No:
Software Version 1.2.0 (FLASH image1), active configuration.
```

System information includes:

- System date and time
- Switch model name and number
- Rack name and location
- MAC address of the switch management processor
- IP address of the switch
- Software image file and version number
- Current configuration block (active, backup, or factory default)
- Login banner, if one is configured

# Show last 100 syslog messages

Command: `/info/sys/log`

```
Date   Time            Severity level                  Message
----   ----         -----------------                  -------
Jul 8 17:25:41             NOTICE              system: link up on port 1
Jul 8 17:25:41             NOTICE              system: link up on port 8
Jul 8 17:25:41             NOTICE              system: link up on port 7
Jul 8 17:25:41             NOTICE              system: link up on port 12
Jul 8 17:25:41             NOTICE              system: link up on port 11
Jul 8 17:25:41             NOTICE              system: link up on port 14
Jul 8 17:25:41             NOTICE              system: link up on port 13
Jul 8 17:25:41             NOTICE              system: link up on port 16
Jul 8 17:25:41             NOTICE              system: link up on port 15
Jul 8 17:25:41             NOTICE              system: link up on port 17
Jul 8 17:25:41             NOTICE              system: link up on port 20
Jul 8 17:25:41             NOTICE              system: link up on port 22
Jul 8 17:25:41             NOTICE              system: link up on port 23
Jul 8 17:25:41             NOTICE              system: link up on port 21
Jul 8 17:25:42             NOTICE              system: link up on port 4
Jul 8 17:25:42             NOTICE              system: link up on port 3
Jul 8 17:25:42             NOTICE              system: link up on port 6
Jul 8 17:25:42             NOTICE              system: link up on port 5
Jul 8 17:25:42             NOTICE              system: link up on port 10
Jul 8 17:25:42             NOTICE              system: link up on port 9
```

Each message contains a date and time field and has a severity level associated with it. One of eight different prefixes is used to indicate the condition:

- EMERG—indicates the system is unusable
- ALERT—indicates action should be taken immediately
- CRIT—indicates critical conditions
- ERR—indicates error conditions or eroded operations
- WARNING—indicates warning conditions
- NOTICE—indicates a normal but significant condition
- INFO—indicates an information message
- DEBUG—indicates a debug-level message

# System user information

Command: `/info/sys/user`

```
Usernames:
  user     - enabled
  oper     - disabled
  admin    - Always Enabled
Current User ID table:
  1: name tech1   , ena, cos user    , password valid, online
  2: name tech2   , ena, cos user    , password valid, offline
```

The following table describes the User Name information.

Table 17 User Name Information menu

| Field | Usage |
|---|---|
| `user` | Displays the status of the `user` access level. |
| `oper` | Displays the status of the `oper` (operator) access level. |
| `admin` | Displays the status of the `admin` (administrator) access level. |
| `Current User ID Table` | Displays the status of configured User ID |

# Layer 2 information

Command: `/info/l2`

```
[Layer 2 Menu]
     fdb      - Forwarding Database Information Menu
     lacp     - Link Aggregation Control Protocol Menu
     stp      - Show STP information
     cist     - Show CIST information
     trunk    - Show Trunk Group information
     vlan     - Show VLAN information
     gen      - Show general information
     dump     - Dump all layer 2 information
```

The following table describes the Layer 2 Information menu options.

Table 18 Layer 2 information menu options

| Command | Usage |
|---|---|
| `fdb` | Displays the Forwarding Database Information Menu. |
| `stp` | In addition to seeing if STP is enabled or disabled, you can view the following STP bridge information:<br>• Priority<br>• Hello interval<br>• Maximum age value<br>• Forwarding delay<br>• Aging time<br>You can also refer to the following port-specific STP information:<br>• Port number and priority<br>• Cost<br>• State |
| `cist` | Displays Common internal Spanning Tree (CIST) bridge information, including the following:<br>• Priority<br>• Hello interval<br>• Maximum age value<br>• Forwarding delay<br>You can also view port-specific CIST information, including the following:<br>• Port number and priority<br>• Cost<br>• State |
| `trunk` | When trunk groups are configured, you can view the state of each port in the various trunk groups. |
| `vlan` | Displays VLAN configuration information, including:<br>• VLAN Number<br>• VLAN Name<br>• Status<br>• Port membership of the VLAN |
| `gen` | Displays general Layer 2 configuration information. |
| `dump` | Dumps all switch information available from the Layer 2 menu (10K or more, depending on your configuration).<br>If you want to capture dump data to a file, set your communication software on your workstation to capture session data prior to issuing the dump commands. |

# FDB information menu

Command: `/info/l2/fdb`

```
[Forwarding Database Menu]
      find    - Show a single FDB entry by MAC address
      port    - Show FDB entries on a single port
      vlan    - Show FDB entries on a single VLAN
      state   - Show FDB entries by state
      dump    - Show all FDB entries
```

The forwarding database (FDB) contains information that maps the media access control (MAC) address of each known device to the switch port where the device address was learned. The FDB also shows which other ports have seen frames destined for a particular MAC address.

NOTE: The master forwarding database supports up to 8K MAC address entries on the management processor (MP) per switch.

Table 19 FDB information menu

| Command | Usage |
|---|---|
| `find <MAC address> [<VLAN>]` | Displays a single database entry by its MAC address. You are prompted to enter the MAC address of the device.<br>Enter the MAC address using the format: xx:xx:xx:xx:xx:xx. (For example: 08:00:20:12:34:56)<br>You can also enter the MAC address using the format: xxxxxxxxxxxx. (For example: 080020123456) |
| `port <port number>` | Displays all FDB entries for a particular port. |
| `vlan <1-4095>` | Displays all FDB entries on a single VLAN. The range is 1-4095. |
| `state unknown\|forward\|trunk` | Displays all FDB entries that match a particular state. |
| `dump` | Displays all entries in the Forwarding Database. |

## Show all FDB information

Command: `/info/l2/fdb/dump`

```
    MAC address     VLAN  Port  Trnk  State
-----------------  ----  ----  ----  -----
00:02:01:00:00:00   300          1    TRK
00:02:01:00:00:01   300   23          FWD
00:02:01:00:00:02   300   23          FWD
00:02:01:00:00:03   300   23          FWD
00:02:01:00:00:04   300   23          FWD
00:02:01:00:00:05   300   23          FWD
00:02:01:00:00:06   300   23          FWD
00:02:01:00:00:07   300   23          FWD
00:02:01:00:00:08   300   23          FWD
00:02:01:00:00:09   300   23          FWD
00:02:01:00:00:0a   300   23          FWD
00:02:01:00:00:0b   300   23          FWD
00:02:01:00:00:0c   300   23          FWD
```

An address that is in the forwarding (FWD) state indicates that the switch has learned it. When in the trunking (TRK) state, the Trnk field displays the trunk group number. If the state for the port is listed as unknown (UNK), the MAC address has not yet been learned by the switch, but has only been seen as a destination address. When an address is in the unknown state, no outbound port is indicated.

## Clearing entries from the forwarding database

To delete a static MAC address from the forwarding database (FDB), see the “Static FDB configuration” section in the “Configuration Menu” chapter. To clear the entire forwarding database (FDB), see the “Forwarding Database options” section in the “Maintenance Menu” chapter.

# Link Aggregation Control Protocol information

Command: `/info/l2/lacp`

```
[LACP Menu]
     aggr     - Show LACP aggregator information for the port
     port     - Show LACP port information
     dump     - Show all LACP ports information
```

The following table describes the Link Aggregation Control Protocol Menu options.

Table 20 LACP information

| Command | Usage |
|---|---|
| `aggr` | Displays LACP aggregator information for the port. |
| `port` | Displays LACP information for the port. |
| `dump` | Displays all LACP information parameters. |

# LACP dump

Command: `/info/l2/lacp/dump`

```
>> LACP# dump
port  lacp      adminkey  operkey  selected    prio    attached  trunk
                                                          aggr
------------------------------------------------------------------------
   1  off             1        1         n    32768        --     --
   2  off             2        2         n    32768        --     --
   3  off             3        3         n    32768        --     --
   4  off             4        4         n    32768        --     --
   5  off             5        5         n    32768        --     --
   6  off             6        6         n    32768        --     --
   7  off             7        7         n    32768        --     --
   8  off             8        8         n    32768        --     --
…
```

LACP dump includes the following information for each port in the switch:

- lacp—Displays the port's LACP mode (active, passive, or off)
- adminkey—Displays the value of the port's adminkey.
- operkey—Shows the value of the port's operational key.
- selected—Indicates whether the port has been selected to be part of a Link Aggregation Group.
- prio—Shows the value of the port priority.
- attached aggr—Displays the aggregator associated with each port.
- trunk—This value represents the LACP trunk group number.

# Spanning Tree information

Command: `/info/l2/stp`

```
------------------------------------------------------------------

upfast disabled, update 40

------------------------------------------------------------------


Spanning Tree Group 1: On (STP/PVST+)
VLANs: 1

Current Root:            Path-Cost    Port  Hello MaxAge FwdDel
 8000 00:02:a5:d1:0f:ed        8       20    2     20     15

Parameters:  Priority  Hello  MaxAge  FwdDel  Aging
              32768      2      20      15     300

Port  Priority   Cost   FastFwd    State       Designated Bridge     Des Port
----  --------   ----   --------  ----------   --------------------- -------
  1          0      0       n      FORWARDING *
  2          0      0       n      FORWARDING *
  3          0      0       n      FORWARDING *
```

The switch software uses the IEEE 802.1D Spanning Tree Protocol (STP). If RSTP/MSTP is turned on, see the "Rapid Spanning Tree and Multiple Spanning Tree information" section for Spanning Tree Group information. In addition to seeing if STP is enabled or disabled, you can view the following STP bridge information:

- Status of Uplink Fast (upfast)
- Current root MAC address
- Path-Cost
- Port
- Hello interval
- Maximum age value
- Forwarding delay
- Aging time

You can also refer to the following port-specific STP information:

- Port number and priority
- Cost
- State
- Port Fast Forwarding state
- Designated bridge
- Designated port

The following table describes the STP parameters.

Table 21 STP parameters

| Parameter | Description |
|---|---|
| `Current Root` | Shows information about the root bridge for the Spanning Tree. Information includes the priority (hex) and MAC address of the root. |
| `Path-Cost` | Path-cost is the total path cost to the root bridge. It is the summation of the path cost between bridges (up to the root bridge). |
| `Port` | The current root port refers to the port on the switch that receives data from the current root. Zero (0) indicates the root bridge of the STP. |
| `Priority (bridge)` | The bridge priority parameter controls which bridge on the network will become the STP root bridge. |
| `Hello` | The hello time parameter specifies, in seconds, how often the root bridge transmits a configuration bridge protocol data unit (BPDU). Any bridge that is not the root bridge uses the root bridge hello value. |
| `MaxAge` | The maximum age parameter specifies, in seconds, the maximum time the bridge waits without receiving a configuration bridge protocol data unit before it reconfigures the STP network. |
| `FwdDel` | The forward delay parameter specifies, in seconds, the amount of time that a bridge port has to wait before it changes from learning state to forwarding state. |
| `Aging` | The aging time parameter specifies, in seconds, the amount of time the bridge waits without receiving a packet from a station before removing the station from the Forwarding Database. |
| `Priority (port)` | The port priority parameter helps determine which bridge port becomes the designated port. In a network topology that has multiple bridge ports connected to a single segment, the port with the lowest port priority becomes the designated port for the segment. |
| `Cost` | The port path cost parameter is used to help determine the designated port for a segment. Generally speaking, the faster the port, the lower the path cost. |
| `State` | The State field shows the current state of the port. The State field can be one of the following: `BLOCKING`, `LISTENING`, `LEARNING`, `FORWARDING`, or `DISABLED`. |
| `Designated bridge` | Shows information about the bridge connected to each port, if applicable. Information includes the priority (hex) and MAC address of the Designated Bridge. |
| `Designated port` | The port ID of the port on the Designated Bridge to which this port is connected. |

# Rapid Spanning Tree and Multiple Spanning Tree information

Command: `/info/l2/stp`

```
------------------------------------------------------------------

upfast disabled, update 40
------------------------------------------------------------------

Spanning Tree Group 1: On (RSTP)
VLANs: 1-3 4095

Current Root:            Path-Cost  Port Hello MaxAge FwdDel
 8000 00:00:01:00:19:00        0       0    9     20     15

Parameters:  Priority  Hello  MaxAge  FwdDel  Aging
              32768      9      20      15     300

Port  Prio  Cost   State  Role    Designated Bridge   Des Port  Type
----  ----  ----  ------  ----  --------------------- --------  ----
  1     0       0     DSB
  2     0       0     DSB
  3     0       0     DSB
  4     0       0     DSB
  5     0       0     DSB
  6     0       0     DSB
  7     0       0     DSB
  8     0       0     DSB
  9     0       0     DSB
 10     0       0     DISC
 11     0       0     FWD   DESG 8000-00:00:01:00:19:00   8017  P2P2,Edge
 12     0       0     FWD   DESG 8000-00:00:01:00:19:00   8018  P2P
```

The switch software can be set to use the IEEE 802.1w Rapid Spanning Tree Protocol (RSTP) or the IEEE 802.1s Multiple Spanning Tree Protocol (MSTP). If RSTP/MSTP is turned on, you can view the following RSTP bridge information for the Spanning Tree Group:

- Status of Uplink Fast (upfast)
- Current root MAC address
- Path-Cost
- Port
- Hello interval
- Maximum age value
- Forwarding delay
- Aging time

You can also refer to the following port-specific RSTP information:

- Port number and priority
- Cost
- State
- Role
- Designated bridge and port
- Link type

The following table describes the STP parameters in RSTP or MSTP mode.

Table 22 Rapid Spanning Tree parameter descriptions

| Parameter | Description |
|---|---|
| `Current Root` | Shows information about the root bridge for the Spanning Tree. Information includes the priority (hex) and MAC address of the root. |
| `Path-Cost` | Path-cost is the total path cost to the root bridge. It is the summation of the path cost between bridges (up to the root bridge). |
| `Port` | The current root port refers to the port on the switch that receives data from the current root. Zero (0) indicates the root bridge of the STP. |
| `Priority (bridge)` | The bridge priority parameter controls which bridge on the network will become the STP root bridge. |
| `Hello` | The hello time parameter specifies, in seconds, how often the root bridge transmits a configurationbridge protocol data unit (BPDU). Any bridge that is not the root bridge uses the root bridge hello value. |
| `MaxAge` | The maximum age parameter specifies, in seconds, the maximum time the bridge waits without receiving a configuration bridge protocol data unit before it reconfigures the STP network. |
| `FwdDel` | The forward delay parameter specifies, in seconds, the amount of time that a bridge port has to wait before it changes from learning state to forwarding state. |
| `Aging` | The aging time parameter specifies, in seconds, the amount of time the bridge waits without receiving a packet from a station before removing the station from the Forwarding Database. |
| `Priority (port)` | The port priority parameter helps determine which bridge port becomes the designated port. In a network topology that has multiple bridge ports connected to a single segment, the port with the lowest port priority becomes the designated port for the segment. |
| `Cost` | The port path cost parameter is used to help determine the designated port for a segment. Generally speaking, the faster the port, the lower the path cost. A setting of zero (0) indicates that the cost will be set to the appropriate default after the link speed has been auto-negotiated. |
| `State` | Shows the current state of the port. The State field in RSTP/MSTP mode can be one of the following: `Discarding (DISC)`, `Learning (LRN)`, `Forwarding (FWD)`, or `Disabled (DSB)`. |
| `Role` | Shows the current role of this port in the Spanning Tree. The port role can be one of the following: Designated (DESG), Root (ROOT), Alternate (ALTN), Backup (BKUP), Master (MAST), or Unknown (UNK). |
| `Designated bridge` | Shows information about the bridge connected to each port, if applicable. Information includes the priority (hex) and MAC address of the Designated Bridge. |
| `Designated port` | The port ID of the port on the Designated Bridge to which this port is connected. |
| `Type` | Type of link connected to the port, and whether the port is an edge port. Link type values are AUTO, P2P, or SHARED.<br>MSTP: The Type field appears in /info/cist. |

# Common Internal Spanning Tree information

Command: `/info/l2/cist`

```
Mstp Digest: 0xac36177f50283cd4b83821d8ab26de62
Common Internal Spanning Tree:
VLANs: 1 3-4094

Current Root:            Path-Cost  Port   MaxAge   FwdDel
 8000 00:03:42:fa:3b:80       11      1       20       15

CIST Regional Root:    Path-Cost
 8000 00:03:42:fa:3b:80       11

Parameters:  Priority  MaxAge  FwdDel  Hops
               32768      20      15    20

Port Prio Cost State  Role Designated Bridge     Des Port Hello Type
---- ---- ---- ------ ---- -------------------- -------- ----- ----
  1  128  2000    FWD   DESG 8000-00:03:42:fa:3b:80  8001    4  P2P, Edge
  2  128   2000   FWD   DESG 8000-00:03:42:fa:3b:80  8002
  3  128   2000   DSB
  4  128   2000   DSB
  5  128   2000   DSB
  6  128   2000   DSB
  7  128   2000   DSB
  8  128   2000   DSB
  9  128   2000   DSB
 10  128   0      DSB
 11  128   2000   FWD   DESG 8000-00:03:42:fa:3b:80
 12  128   2000   DSB
```

In addition to seeing if Common Internal Spanning Tree (CIST) is enabled or disabled, you can view the following CIST bridge information:

- Status of Uplink Fast (upfast)
- CIST root
- CIST regional root
- Priority
- Maximum age value
- Forwarding delay
- Hops

You can also refer to the following port-specific CIST information:

- Port number and priority
- Cost
- State
- Role
- Designated bridge and port
- Hello interval
- Link type and port type

The following table describes the CIST parameters.

Table 23 Common Internal Spanning Tree parameter descriptions

| Parameter | Description |
|---|---|
| CIST Root | Shows information about the root bridge for the Common Internal Spanning Tree (CIST). Values on this row of information refer to the CIST root. |
| CIST Regional Root | Shows information about the root bridge for this MSTP region. Values on this row of information refer to the regional root. |
| Priority (bridge) | The bridge priority parameter controls which bridge on the network will become the STP root bridge. |
| MaxAge | The maximum age parameter specifies, in seconds, the maximum time the bridge waits without receiving a configuration bridge protocol data unit before it reconfigures the STP network. |
| FwdDel | The forward delay parameter specifies, in seconds, the amount of time that a bridge port has to wait before it changes from learning state to forwarding state. |
| Hops | Shows the maximum number of bridge hops allowed before a packet is dropped. |
| Priority (port) | The port priority parameter helps determine which bridge port becomes the designated port. In a network topology that has multiple bridge ports connected to a single segment, the port with the lowest port priority becomes the designated port for the segment. |
| Cost | The port path cost parameter is used to help determine the designated port for a segment. Generally speaking, the faster the port, the lower the path cost. A setting of zero (0) indicates that the cost will be set to the appropriate default after the link speed has been auto-negotiated. |
| State | Shows the current state of the port. The state field can be one of the following: Discarding (DISC), Learning (LRN), Forwarding (FWD), or Disabled (DSB). |
| Role | Shows the current role of this port in the Spanning Tree. The port role can be one of the following: Designated (DESG), Root (ROOT), Alternate (ALTN), Backup (BKUP), Master (MAST), or Unknown (UNK). |
| Designated Bridge | Shows information about the bridge connected to each port, if applicable. Information includes the priority (hex) and MAC address of the Designated Bridge. |
| Designated Port | The port ID of the port on the Designated Bridge to which this port is connected. Information includes the port priority (hex) and the port number (hex). |
| Hello | The hello time parameter specifies, in seconds, how often the root bridge transmits a configuration bridge protocol data unit (BPDU). Any bridge that is not the root bridge uses the root bridge hello value. |
| Type | Type of link connected to the port, and whether the port is an edge port. Link type values are AUTO, P2P, or SHARED. |

# Trunk group information

Command: `/info/l2/trunk`

```
Trunk group 1, Enabled
port state:
  17: STG  1 forwarding
  18: STG  1 forwarding
```

When trunk groups are configured, you can view the state of each port in the various trunk groups.

NOTE: If Spanning Tree Protocol on any port in the trunk group is set to forwarding, the remaining ports in the trunk group will also be set to forwarding.

# VLAN information

Command: `/info/l2/vlan`

```
VLAN                Name                Status  Ports
----  --------------------------------- ------  ----------------
1     Default VLAN                        ena    4  5
2     pc03p                               ena    2
7     pc07f                               ena    7
11    pc04u                               ena    11
14    8600-14                             ena    14
15    8600-15                             ena    15
16    8600-16                             ena    16
17    8600-17                             ena    17
18    35k-1                               ena    18
20    35k-3                               ena    20
21    35k-4                               ena    21
22    pc07z                               ena    22
24    redlan                              ena    24
300   ixiaTraffic                         ena    1 12 13 23
4000  bpsports                            ena    3-6 8-10
4095  Mgmt VLAN                           ena    19
```

This information display includes all configured VLANs and all member ports that have an active link state.

VLAN information includes:

- VLAN Number
- VLAN Name
- Status
- Port membership of the VLAN

# Layer 2 general information

Command: `/info/l2/gen`

```
STP uplink fast mode : disabled
```

The following table describes the Layer 2 general information.

Table 24 Layer 2 general information

| Field | Description |
|---|---|
| `STP uplink fast mode` | Displays the status of STP Uplink Fast: enabled or disabled. |

# Layer 3 information

Command: `/info/l3`

```
[Layer 3 Menu]
     arp      - ARP Information Menu
     ip       - Show IP information
     igmp     - Show IGMP Snooping Multicast Group information
     dump     - Dump all layer 3 information
```

The following table describes the Layer 3 Information Menu options. Layer 3 functionality is limited in this release.

Table 25 Layer 3 information menu options

| Command | Usage |
|---|---|
| `arp` | Displays the Address Resolution Protocol (ARP) Information Menu. |
| `ip` | Displays IP Information. IP information, includes:<br>• IP interface information: Interface number, IP address, subnet mask, VLAN number, and operational status.<br>• Default gateway information: Metric for selecting which configured gateway to use, gateway number, IP address, and health status<br>• IP forwarding information: Enable status, lnet and lmask<br>• Port status |
| `igmp` | Displays IGMP Information Menu. |
| `dump` | Dumps all switch information available from the Layer 3 Menu (10K or more, depending on your configuration).<br>If you want to capture dump data to a file, set your communication software on your workstation to capture session data prior to issuing the dump commands. |

# ARP information

Command: `/info/arp`

```
[Address Resolution Protocol Menu]
      find    - Show a single ARP entry by IP address
      port    - Show ARP entries on a single port
      vlan    - Show ARP entries on a single VLAN
      addr    - Show ARP entries for switch's interface
      dump    - Show all ARP entries
```

The Address Resolution Protocol (ARP) information includes IP address and MAC address of each entry, address status flags, VLAN, and port for the address, and port referencing information.

The following table describes the Address Resolution Protocol Menu options.

Table 26 ARP information

| Command | Usage |
|---|---|
| `find <IP address>` | Displays a single ARP entry by IP address. For example, 192.4.17.101 |
| `port <port number>` | Displays the ARP entries on a single port. |
| `vlan <1-4095>` | Displays the ARP entries on a single VLAN. |
| `addr` | Displays the ARP address list: IP address, IP mask, MAC address, and VLAN flags. |
| `dump` | Displays all ARP entries, including:<br>• IP address and MAC address of each entry<br>• Address status flag<br>• The VLAN and port to which the address belongs<br>The ports which have referenced the address (empty if no port has routed traffic to the IP address shown) |

## ARP address list information

Command: `/info/arp/addr`

```
   IP address        IP mask        MAC address     VLAN Flags
--------------- ---------------  ----------------- ---- -----
205.178.18.66   255.255.255.255  00:70:cf:03:20:04 4095
205.178.50.1    255.255.255.255  00:70:cf:03:20:04    1
```

## Show all ARP entry information

Command: `/info/arp/dump`

```
IP address      Flags     MAC address               VLAN      Port
--------------- -----    -----------------          ----      ----
192.168.2.4             00:50:8b:b2:32:cb          1         18
192.168.2.19            00:0e:7f:25:89:b5          1         17
192.168.2.61    P       00:0f:6a:ed:46:00          1
```

The Flag field provides additional information about an entry. If no flag displays, the entry is normal.

Table 27 ARP dump flag parameters

| Flag | Description |
|---|---|
| P | Permanent entry created for switch IP interface. |
| R | Indirect route entry. |
| U | Unresolved ARP entry. The MAC address has not been learned. |

# IP information

Command: `/info/l3/ip`

```
Interface information:
  1: 47.80.23.243    255.255.254.0   47.80.23.255,    vlan 1, up
Default gateway information: metric strict
  1: 47.80.22.1,      up
  2: 47.80.225.2,     up
```

The following interface and default gateway information is displayed:

- Interface number
- IP address
- IP mask
- IP broadcast address
- Operational status

# IGMP multicast group information

Command: `/info/l3/igmp`

```
[IGMP Multicast Group Menu]
      mrouter - Show IGMP Snooping Multicast Router Port information
      find    - Show a single group by IP group address
      vlan    - Show groups on a single vlan
      port    - Show groups on a single port
      trunk   - Show groups on a single trunk
      dump    - Show all groups
```

The following table describes the commands used to display information about IGMP groups learned by the switch.

Table 28 IGMP Multicast Group menu options

| Command | Usage |
|---|---|
| `mrouter` | Displays the Multicast Router Menu. |
| `find <IP address>` | Displays a single IGMP multicast group by its IP address. |
| `vlan <1-4094>` | Displays all IGMP multicast groups on a single VLAN. |
| `port <port number>` | Displays all IGMP multicast groups on a single port. |
| `trunk <1-40>` | Displays all IGMP multicast groups on a single trunk group. |
| `dump` | Displays information for all multicast groups. |

# IGMP multicast router port information

Command: `/info/l3/igmp/mrouter`

```
[IGMP Multicast Router Menu]
      vlan - Show all multicast router ports on a single vlan
      dump - Show all multicast router ports
```

The following table describes the commands used to display information about multicast routers learned through IGMP Snooping.

Table 29 IGMP Multicast Router menu options

| Command | Usage |
|---|---|
| `vlan <1-4094>` | Displays information for all multicast groups on a single VLAN. |
| `dump` | Displays information for all multicast groups learned by the switch. |

# RMON Information Menu

Command: `/info/rmon`

```
[RMON Information Menu]
      hist    - Show RMON History group information
      alarm   - Show RMON Alarm group information
      event   - Show RMON Event group information
      dump    - Show all RMON information
```

The following table describes the RMON Information parameters.

Table 30 RMON History Information Menu `/info/rmon/hist`

| Command | Usage |
|---|---|
| `hist` | Displays the RMON History Information menu. |
| `alarm` | Displays the RMON Alarm Information menu. |
| `event` | Displays the RMON Event Information menu. |
| `dump` | Displays all RMON Information parameters. |

# RMON history information

Command: `/info/rmon/hist`

```
RMON History group configuration:

Index               IFOID               Interval  Rbnum  Gbnum
-----  -------------------------------  --------  -----  -----
    1          1.3.6.1.2.1.2.2.1.1.24        30      5      5
    2          1.3.6.1.2.1.2.2.1.1.24        30      5      5
    3          1.3.6.1.2.1.2.2.1.1.18        30      5      5
    4          1.3.6.1.2.1.2.2.1.1.19        30      5      5
    5          1.3.6.1.2.1.2.2.1.1.24      1800      5      5
```

The following table describes the RMON History Information parameters.

Table 31 RMON History Information Menu `/info/rmon/hist`

| Command | Usage |
|---|---|
| `Index` | Displays the index number that identifies each history instance. |
| `IFOID` | Displays the MIB Object Identifier. |
| `Interval` | Displays the time interval for each for each sampling bucket. |
| `Rbnum` | Displays the number of requested buckets, which is the number of data slots into which data is to be saved. |
| `Gbnum` | Displays the number of granted buckets that may hold sampled data. |

# RMON alarm information

Command: `/info/rmon/alarm`

```
RMON Alarm group configuration:

Index  Interval  Type   rLimit    fLimit   rEvtIdx  fEvtIdx  last value
-----  --------  ----  --------  --------  -------  -------  ----------
    1        30   abs        10         0        1        0           0
    2       900   abs         0        10        0        2           0
    3       300   abs        10        20        0        0           0
    4      1800   abs        10         0        1        0           0
    5      1800   abs        10         0        1        0           0
    8      1800   abs        10         0        1        0    56344540
   10      1800   abs        10         0        1        0           0
   11      1800   abs        10         0        1        0           0
   15      1800   abs        10         0        1        0           0
   18      1800   abs        10         0        1        0           0
  100      1800   abs        10         0        1        0           0

Index               OID
-----  ------------------------------
    1        1.3.6.1.2.1.2.2.1.10.257
    2        1.3.6.1.2.1.2.2.1.11.258
    3        1.3.6.1.2.1.2.2.1.12.259
    4        1.3.6.1.2.1.2.2.1.13.260
    5        1.3.6.1.2.1.2.2.1.14.261
    8        1.3.6.1.2.1.2.2.1.10.280
   10        1.3.6.1.2.1.2.2.1.15.262
   11        1.3.6.1.2.1.2.2.1.16.263
   15        1.3.6.1.2.1.2.2.1.19.266
   18        1.3.6.1.2.1.2.2.1.10.279
  100        1.3.6.1.2.1.2.2.1.17.264
```

The following table describes the RMON Alarm Information parameters.

Table 32 RMON Alarm Information Menu `/info/rmon/alarm`

| Command | |
|---|---|
| `Index` | Displays the index number that identifies each alarm instance. |
| `Interval` | Displays the time interval over which data is sampled and compared with the rising and falling thresholds. |
| `Type` | Displays the method of sampling the selected variable and calculating the value to be compared against the thresholds, as follows:<br>abs: absolute value, the value of the selected variable is compared directly with the thresholds at the end of the sampling interval.<br>delta: delta value, the value of the selected variable at the last sample is subtracted from the current value, and the difference compared with the thresholds. |
| `rLimit` | Displays the rising threshold for the sampled statistic. |
| `fLimit` | Displays the falling threshold for the sampled statistic. |
| `rEvtIdx` | Displays the rising alarm event index that is triggered when a rising threshold is crossed. |
| `fEvtIdx` | Displays the falling alarm event index that is triggered when a falling threshold is crossed. |
| `Last value` | Displays the last sampled value. |
| `OID` | Displays the MIB Object Identifier for each alarm index. |

## RMON event information

Command: `/info/rmon/event`

```
RMON Event group configuration:

Index  Type     Last Sent                Description
-----  ----  ----------------  ---------------------------------
    1  both    0D: 0H: 1M:20S   Event_1
    2  none    0D: 0H: 0M: 0S   Event_2
    3   log    0D: 0H: 0M: 0S   Event_3
    4  trap    0D: 0H: 0M: 0S   Event_4
    5  both    0D: 0H: 0M: 0S   Log and trap event for Link Down
   10  both    0D: 0H: 0M: 0S   Log and trap event for Link Up
   11  both    0D: 0H: 0M: 0S   Send log and trap for icmpInMsg
   15  both    0D: 0H: 0M: 0S   Send log and trap for icmpInEchos
  100  both    0D: 0H: 0M: 0S   Event_100
```

The following table describes the RMON Event Information parameters.

Table 33 RMON Event Information Menu `/info/rmon/event`

| Command | Usage |
|---|---|
| `Index` | Displays the index number that identifies each event instance. |
| `Type` | Displays the type of notification provided for this event, as follows: `none, log, trap, both`. |
| `Last Sent` | Displays the time that passed since the last switch reboot, when the most recent event was triggered. This value is cleared when the switch reboots. |
| `Description` | Displays a text description of the event. |

# Link status information

Command: `/info/link`

```
-------------------------------------------------------------------
Port   Speed    Duplex     Flow Ctrl      Link
----   -----   --------  --TX-----RX--   ------
  1    1000       any     yes    yes      down
  2    1000       any     yes    yes      down
  3    1000       full    yes    yes      down
  4    1000       full    yes    yes      down
  5    1000       any     yes    yes      down
  6    1000       any     yes    yes      down
  7    1000       any     yes    yes      down
  8    1000       full    yes    yes       up
  9    1000       full    yes    yes      down
 10    1000       full    yes    yes      down
 11    1000       any     yes    yes      down
 12    1000       any     yes    yes      down
 13    1000       any     yes    yes      down
 14    1000       any     yes    yes      down
 15    1000       any     yes    yes      down
 16    1000       any     yes    yes      down
 17    1000       full    yes    yes       up
 18    1000       full    yes    yes       up
 19    100        full    yes    yes       up
 20    100        full    yes    yes      down
 21    1000       full    yes    yes      down
 22    1000       full    no     yes      down
 23    any        any     yes    yes      down
 24    any        any     yes    yes      down
```

Use this command to display link status information about each port on a switch, including:

- Port number
- Port speed (10 Mb/s, 100 Mb/s, 1000 Mb/s, or any)
- Duplex mode (half, full, or any)
- Flow control for transmit and receive (no, yes, or any)
- Link status (up or down)

# Port information

Command: `/info/port`

```
Port Tag RMON PVID      NAME                 VLAN(s)
---- --- ---- ---- -------------- --------------------------------
  1   n   d      1 Downlink1      1
  2   n   d      1 Downlink2      1
  3   n   d      1 Downlink3      1
  4   n   d      1 Downlink4      1
  5   n   d      1 Downlink5      1
  6   n   d      1 Downlink6      1
  7   n   d      1 Downlink7      1
  8   n   d      1 Downlink8      1
  9   n   d      1 Downlink9      1
 10   n   d      1 Downlink10     1
 11   n   d      1 Downlink11     1
 12   n   d      1 Downlink12     1
 13   n   d      1 Downlink13     1
 14   n   d      1 Downlink14     1
 15   n   d      1 Downlink15     1
 16   n   d      1 Downlink16     1
 17   n   d      1 Xconnect1      1
 18   n   d      1 Xconnect2      1
 19   n   d   4095 Mgmt           4095
 20   n   d      1 Uplink1        1
 21   n   d      1 Uplink2        1
 22   n   d      1 Uplink3        1
 23   n   d      1 Uplink4        1
 24   n   d      1 Uplink5        1
```

Port information includes:

- Port number
- Whether the port uses VLAN tagging or not (y or n)
- Whether Remote Monitoring (RMON) is enabled or disabled (e or d)
- Port VLAN ID (PVID)
- Port name
- VLAN membership

# Logical Port to GEA Port mapping

Command: `/info/geaport`

```
Logical Port  GEA Port(0-based)  GEA Unit
------------  -----------------  ---------
     1                1                0
     2                2                0
     3                4                0
     4                7                0
     5                8                0
     6               12                0
     7               13                0
     8               14                0
     9                0                0
    10                3                0
    11                5                0
    12                6                0
    13                9                0
    14               10                0
    15               11                0
    16               15                0
    17               16                0
    18               17                0
    19               18                0
    20               19                0
    21               23                0
    22               22                0
    23               21                0
    24               20                0
```

This display correlates the logical port number to the GEA unit on which each port resides.

# Uplink Failure Detection information

Command: `/info/ufd`

```
Uplink Failure Detection 1: Enabled
LtM status: Down
Member      STG    STG State       Link Status
---------   ---    ------------    -----------
  port 24                          down
             1       DISABLED
            10       DISABLED *
            15       DISABLED *
* = STP turned off for this port.

LtD status: Auto Disabled
Member       Link Status
---------    -----------
  port  1      disabled
  port  2      disabled
  port  3      disabled
  port  4      disabled

Uplink Failure Detection 2: Disabled

Uplink Failure Detection 3: Disabled

Uplink Failure Detection 4: Disabled
```

Uplink Failure Detection (UFD) information includes:

- UFD status, either enabled or disabled
- LtM status and member ports
- Spanning Tree status for LtM ports
- LtD status and member ports

# Information dump

Command: `/info/dump`

Use the dump command to dump all switch information available from the Information Menu (10K or more, depending on your configuration). This data is useful for tuning and debugging switch performance.

If you want to capture dump data to a file, set the communication software on your workstation to capture session data prior to issuing the dump commands.

# Statistics Menu

## Introduction

You can view switch performance statistics in the user, operator, and administrator command modes. This chapter discusses how to use the CLI to display switch statistics.

## Menu information

Command: `/stats`

```
[Statistics Menu]
     port     - Port Stats Menu
     l2       - Layer 2 Stats Menu
     l3       - Layer 3 Stats Menu
     mp       - MP-specific Stats Menu
     snmp     - Show SNMP stats
     ntp      - Show NTP stats
     ufd      - Show Uplink Failure Detection stats
     clrmp    - Clear all MP related stats
     dump     - Dump all stats
```

The following table describes the Statistics Menu options.

Table 34 Statistics Menu options

| Command | Usage |
|---|---|
| `port <port number>` | Displays the Port Statistics Menu for the specified port. Use this command to display traffic statistics on a port-by-port basis. Traffic statistics are included in SNMP Management Information Base (MIB) objects. |
| `l2` | Displays the Layer 2 Statistics Menu. |
| `l3` | Displays the Layer 3 Statistics Menu. |
| `mp` | Displays the Management Processor Statistics Menu. Use this command to view information on how switch management processes and resources are currently being allocated. |
| `snmp` | Displays SNMP statistics. |
| `ntp <clear>` | Displays Network Time Protocol (NTP) Statistics.<br>Add the argument, `clear`, to clear NTP statistics |
| `ufd <clear>` | Displays Uplink Failure Detection statistics.<br>Add the argument, `clear`, to clear UFD statistics. |
| `clrmp` | Clears all Management Processor statistics. |
| `dump` | Dumps all switch statistics. Use this command to gather data for tuning and debugging switch performance. If you want to capture dump data to a file, set your communication software on your workstation to capture session data prior to issuing the dump command. |

# Port Statistics Menu

Command: `/stats/port <port number>`

```
[Port Statistics Menu]
      brg     - Show bridging ("dot1") stats
      ether   - Show Ethernet ("dot3") stats
      if      - Show interface ("if") stats
      ip      - Show Internet Protocol ("IP") stats
      link    - Show link stats
      rmon    - Show RMON stats
      clear   - Clear all port stats
```

This menu displays traffic statistics on a port-by-port basis.

The following table describes the Port Statistics Menu options:

Table 35 Port Statistics Menu options

| Command | Usage |
|---|---|
| `brg` | Displays bridging (“dot1”) statistics for the port. |
| `ether` | Displays Ethernet (“dot3”) statistics for the port. |
| `if` | Displays interface statistics for the port. |
| `ip` | Displays Internet Protocol statistics for the port. |
| `link` | Displays link statistics for the port. |
| `rmon` | Displays Remote Monitoring (RMON) statistics for the port. |
| `clear` | Clears all the statistics on the port. |

## Bridging statistics

Command: `/stats/port <port number>/brg`

```
Bridging statistics for port 1:
dot1PortInFrames:                   63242584
dot1PortOutFrames:                  63277826
dot1PortInDiscards:                        0
dot1TpLearnedEntryDiscards:                0
dot1StpPortForwardTransitions:             0
```

The following table describes the bridging statistics for a selected port:

Table 36 Bridging statistics for port

| Statistics | Description |
|---|---|
| `dot1PortInFrames` | The number of frames that have been received by this port from its segment.<br>A frame received on the interface corresponding to this port is counted by this object, if and only if, it is for a protocol being processed by the local bridging function, including bridge management frames. |
| `dot1PortOutFrames` | The number of frames that have been transmitted by this port to its segment.<br>A frame transmitted on the interface corresponding to this port is counted by this object, if and only if, it is for a protocol being processed by the local bridging function, including bridge management frames. |
| `dot1PortInDiscards` | Count of valid frames received which were discarded (that is, filtered) by the forwarding process. |
| `dot1TpLearnedEntryDiscards` | The total number of Forwarding Database entries, which have been or would have been learned, but have been discarded due to a lack of space to store them in the Forwarding Database.<br>If this counter is increasing, it indicates that the Forwarding Database is regularly becoming full (a condition which has adverse performance effects on the sub network).<br>If this counter has a significant value but is not presently increasing, it indicates that the problem has been occurring but is not persistent. |
| `dot1StpPortForwardTransitions` | The number of times this port has transitioned from the Learning state to the Forwarding state. |

# Ethernet statistics

Command: `/stats/port <port number>/ether`

```
Ethernet statistics for port 1:
dot3StatsAlignmentErrors:                0
dot3StatsFCSErrors:                      0
dot3StatsSingleCollisionFrames:          0
dot3StatsMultipleCollisionFrames:        0
dot3StatsLateCollisions:                 0
dot3StatsExcessiveCollisions:            0
dot3StatsInternalMacTransmitErrors:      0
dot3StatsFrameTooLongs:                  0
dot3StatsInternalMacReceiveErrors:       0
```

The following table describes the Ethernet statistics for a selected port:

Table 37 Ethernet statistics for port

| Statistics | Description |
|---|---|
| dot3StatsAlignmentErrors | A count of frames received on a particular interface that are not an integral number of octets in length and do not pass the Frame Check Sequence (FCS) check.<br>The count represented by an instance of this object is incremented when the alignmentError status is returned by the MAC service to the Logical Link Control (LLC) (or other MAC user).<br>Received frames for which multiple error conditions obtained are, according to the conventions of IEEE 802.3 Layer Management, counted exclusively according to the error status presented to the LLC. |
| dot3StatsFCSErrors | A count of frames received on a particular interface that are an integral number of octets in length but do not pass the Frame Check Sequence (FCS) check.<br>The count represented by an instance of this object is incremented when the frameCheckError status is returned by the MAC service to the LLC (or other MAC user).<br>Received frames for which multiple error conditions obtained are, according to the conventions of IEEE 802.3 Layer Management, counted exclusively according to the error status presented to the LLC. |
| dot3StatsSingleCollisionFrames | A count of successfully transmitted frames on a particular interface for which transmission is inhibited by exactly one collision.<br>A frame that is counted by an instance of this object is also counted by the corresponding instance of the ifOutUcastPkts, ifOutMulticastPkts, or ifOutBroadcastPkts, and is not counted by the corresponding instance of the dot3StatsMultipleCollisionFrame object. |
| dot3StatsMultipleCollisionFrames | A count of successfully transmitted frames on a particular interface for which transmission is inhibited by more than one collision.<br>A frame that is counted by an instance of this object is also counted by the corresponding instance of either the ifOutUcastPkts, ifOutMulticastPkts, or ifOutBroadcastPkts, and is not counted by the corresponding instance of the dot3StatsSingleCollisionFrames object. |
| dot3StatsLateCollisions | The number of times that a collision is detected on a particular interface later than 512 bit-times into the transmission of a packet.<br>Five hundred and twelve bit-times corresponds to 51.2 microseconds on a 10 Mbit/s system. A (late) collision included in a count represented by an instance of this object is also considered as a (generic) collision for purposes of other collision-related statistics. |
| dot3StatsExcessiveCollisions | A count of frames for which transmission on a particular interface fails due to excessive collisions. |

Table 37 Ethernet statistics for port

| Statistics | Description |
|---|---|
| dot3StatsInternalMacTransmitErrors | A count of frames for which transmission on a particular interface fails due to an internal MAC sublayer transmit error. A frame is only counted by an instance of this object if it is not counted by the corresponding instance of either the dot3StatsLateCollisions object, the dot3StatsExcessiveCollisions object, or the dot3StatsCarrierSenseErrors object. The precise meaning of the count represented by an instance of this object is implementation specific. In particular, an instance of this object may represent a count of transmission errors on a particular interface that are not otherwise counted. |
| dot3StatsFrameTooLongs | A count of frames received on a particular interface that exceeds the maximum permitted frame size. The count represented by an instance of this object is incremented when the frameTooLong status is returned by the MAC service to the LLC (or other MAC user). Received frames for which multiple error conditions obtained are, according to the conventions of IEEE 802.3 Layer Management, counted exclusively according to the error status presented to the LLC. |
| dot3StatsInternalMacReceiveErrors | A count of frames for which reception on a particular interface fails due to an internal MAC sublayer receive error. A frame is only counted by an instance of this object if it is not counted by the corresponding instance of the dot3StatsFrameTooLongs object, the dot3StatsAlignmentErrors object, or the dot3StatsFCSErrors object. The precise meaning of the count represented by an instance of this object is implementation specific. In particular, an instance of this object may represent a count of received errors on a particular interface that are not otherwise counted. |

# Interface statistics

Command: `/stats/port <port number>/if`

```
Interface statistics for port 1:
                    ifHCIn Counters       ifHCOut Counters
Octets:                 51697080313             51721056808
UcastPkts:                 65356399                65385714
BroadcastPkts:                    0                    6516
MulticastPkts:                    0                       0
Discards:                         0                       0
Errors:                           0                   21187
```

The following table describes the interface (IF) statistics for a selected port:

Table 38 Interface statistics for port

| Statistics | Description |
|---|---|
| Octets—IfHCIn | The total number of octets received on the interface, including framing characters. |
| UcastPkts—IfHCIn | The number of packets, delivered by this sublayer to a higher sublayer, which were not addressed to a multicast or broadcast address at this sublayer. |
| BroadcastPkts—IfHCIn | The number of packets, delivered by this sublayer to a higher sublayer, which were addressed to a broadcast address at this sublayer. |
| MulticastPkts—IfHCIn | The total number of packets, delivered by this sublayer. These are the packets that higher-level protocols requested to be transmitted, and which were addressed to a multicast address at this sublayer, including those that were discarded or not sent. For a MAC layer protocol, this includes both group and functional addresses. |
| Discards—IfHCIn | The number of inbound packets which were chosen to be discarded even though no errors were detected to prevent their being delivered to a higher-layer protocol. One possible reason for discarding such a packet could be to free up buffer space. |

Table 38 Interface statistics for port

| Statistics | Description |
|---|---|
| Errors—IfHCIn | For packet-oriented interfaces, the number of inbound packets that contained errors preventing them from being delivered to a higher-layer protocol.<br>For character-oriented or fixed-length interfaces, the number of inbound transmission units that contained errors preventing them from being deliverable to a higher-layer protocol. |
| Octets—IfHCOut | The total number of octets transmitted out of the interface, including framing characters. |
| UcastPkts—IfHCOut | The total number of packets that higher-level protocols requested to be transmitted, and which were not addressed to a multicast or broadcast address at this sublayer, including those that were discarded or not sent. |
| BroadcastPkts—IfHCOut | The total number of packets that higher-level protocols requested to be transmitted, and which were addressed to a broadcast address at this sublayer, including those that were discarded or not sent. This object is a 64-bit version of ifOutBroadcastPkts. |
| MulticastPkts—IfHCOut | The total number of packets that higher-level protocols requested to be transmitted, and which were addressed to a multicast address at this sublayer, including those that were discarded or not sent.<br>For a MAC layer protocol, this includes both group and functional addresses. This object is a 64-bit version of ifOutMulticastPkts. |
| Discards—IfHCOut | The number of outbound packets that were chosen to be discarded even though no errors had been detected to prevent their being transmitted. One possible reason for discarding such a packet could be to free up buffer space. |
| Errors—IfHCOut | For packet-oriented interfaces, the number of outbound packets that could not be transmitted because of errors.<br>For character-oriented or fixed-length interfaces, the number of outbound transmission units that could not be transmitted because of errors. |

## Internet Protocol (IP) statistics

Command: `/stats/port <port number>/ip`

```
GEA IP statistics for port 1:
ipInReceives   :          0
ipInHeaderError:          0
ipInDiscards   :          0
```

The following table describes the Internet Protocol (IP) statistics for a selected port:

Table 39 IP statistics for port

| Statistics | Description |
|---|---|
| ipInReceives | The total number of input datagrams received from interfaces, including those received in error. |
| ipInHeaderError | The number of input datagrams discarded because the IP address in their IP header's destination field was not a valid address to be received at this entity (the switch). |
| ipInDiscards | The number of input IP datagrams for which no problems were encountered to prevent their continued processing, but which were discarded (for example, for lack of buffer space). Note that this counter does not include any datagrams discarded while awaiting re-assembly. |

## Link statistics

Command: `/stats/port <port number>/link`

```
Link statistics for port 1:
linkStateChange:              2
```

The following table describes the link statistics for a selected port:

Table 40 Link statistics for port

| Statistic | Description |
|---|---|
| linkStateChange | The total number of link state changes. |

## Port RMON statistics

Command: `/stats/port <port number>/rmon`

```
RMON statistics for port 2:
etherStatsDropEvents:                      NA
etherStatsOctets:                           0
etherStatsPkts:                             0
etherStatsBroadcastPkts:                    0
etherStatsMulticastPkts:                    0
etherStatsCRCAlignErrors:                   0
etherStatsUndersizePkts:                    0
etherStatsOversizePkts:                     0
etherStatsFragments:                        0
etherStatsJabbers:                          0
etherStatsCollisions:                       0
etherStatsPkts64Octets:                     0
etherStatsPkts65to127Octets:                0
etherStatsPkts128to255Octets:               0
etherStatsPkts256to511Octets:               0
etherStatsPkts512to1023Octets:              0
etherStatsPkts1024to1518Octets:             0
```

The following table describes the Remote Monitoring (RMON) statistics of the selected port:

Table 41 RMON statistics

| Statistic | Description |
|---|---|
| etherStatsDropEvents | The total number of packets received that were dropped because of system resource constraints. |
| etherStatsOctets | The total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets). |
| etherStatsPkts | The total number of packets (including bad packets, broadcast packets, and multicast packets) received. |
| etherStatsBroadcastPkts | The total number of good packets received that were directed to the broadcast address. |
| etherStatsMulticastPkts | The total number of good packets received that were directed to a multicast address. |
| etherStatsCRCAlignErrors | The total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error). |
| etherStatsUndersizePkts | The total number of packets received that were less than 64 octets long (excluding framing bits but including FCS octets) and were otherwise well formed. |
| etherStatsOversizePkts | The total number of packets received that were longer than 1518 octets (excluding framing bits but including FCS octets) and were otherwise well formed. |

Table 41 RMON statistics

| Statistic | Description |
|---|---|
| etherStatsFragments | The total number of packets received that were less than 64 octets in length (excluding framing bits but including FCS octets) and had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error). |
| etherStatsJabbers | The total number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error). Jabber is defined as the condition where any packet exceeds 20 ms. The allowed range to detect jabber is between 20 ms and 150 ms. |
| etherStatsCollisions | The best estimate of the total number of collisions on this Ethernet segment. |
| etherStatsPkts64 Octets | The total number of packets (including bad packets) received that were less than or equal to 64 octets in length (excluding framing bits but including FCS octets). |
| etherStatsPkts65to127 Octets | The total number of packets (including bad packets) received that were greater than 64 octets in length (excluding framing bits but including FCS octets). |
| etherStatsPkts128to255 Octets | The total number of packets (including bad packets) received that were greater than 127 octets in length (excluding framing bits but including FCS octets). |
| etherStatsPkts256to511 Octets | The total number of packets (including bad packets) received that were greater than 255 octets in length (excluding framing bits but including FCSoctets). |
| etherStatsPkts512to1023 Octets | The total number of packets (including bad packets) received that were greater than 511 octets in length (excluding framing bits but including FCS octets). |
| etherStatsPkts1024to1518 Octets | The total number of packets (including bad packets) received that were greater than 1023 octets in length (excluding framing bits but including FCS octets). |

# Layer 2 statistics

Command: `/stats/l2`

```
[Layer 2 Statistics Menu]
     fdb      - Show FDB stats
     lacp     - Show LACP stats
```

The following table describes the Layer 2 statistics menu options.

Table 42 Layer 2 statistics menu options

| Command | Usage |
|---|---|
| fdb | Displays the Forwarding Database statistics. |
| lacp | Displays the Link Aggregation Control Protocol statistics. |

## FDB statistics

Command: `/stats/l2/fdb`

```
FDB statistics:
 current:            91   hiwat:               91
```

This menu option enables you to display statistics regarding the use of the forwarding database, including the number of current entries and the maximum number of entries ever recorded.

The following table describes the Forwarding Database (FDB) statistics:

Table 43 Forwarding Database statistics

| Statistic | Description |
|---|---|
| current | Current number of entries in the Forwarding Database. |
| hiwat | Highest number of entries recorded at any given time in the Forwarding Database. |

## LACP statistics

Command: `/stats/l2/lacp <port number>`

```
Valid LACPDUs received          - 0
Valid Marker PDUs received      - 0
Valid Marker Rsp PDUs received - 0
Unknown version/TLV type        - 0
Illegal subtype received        - 0
LACPDUs transmitted             - 0
Marker PDUs transmitted         - 0
Marker Rsp PDUs transmitted     - 0
```

# Layer 3 statistics

Command: `/stats/l3`

```
[Layer 3 Statistics Menu]
     geal3    - GEA Layer 3 Stats Menu
     ip       - Show IP stats
     arp      - Show ARP stats
     dns      - Show DNS stats
     icmp     - Show ICMP stats
     tcp      - Show TCP stats
     udp      - Show UDP stats
     igmp     - Show IGMP stats
     clrigmp  - Clear IGMP stats
     ipclear  - Clear IP stats
     dump     - Dump layer 3 stats
```

The following table describes the Layer 3 statistics menu options. Layer 3 functionality is limited in this release.

Table 44 Layer 3 statistics menu options

| Command | Usage |
|---|---|
| geal3 | Displays the GEA statistics menu. |
| ip | IP statistics. |
| arp | Displays Address Resolution Protocol (ARP) statistics. Add the argument, clear, to clear ARP statistics. |
| dns | Displays Domain Name System (DNS) statistics. |
| icmp | Displays ICMP statistics. |
| tcp | Displays Transmission Control Protocol (TCP) statistics. Add the argument, clear, to clear TCP statistics. |
| udp | Displays User Datagram Protocol (UDP) statistics. Add the argument, clear, to clear UDP statistics. |
| igmp | Displays IGMP statistics. |
| clrigmp *<1-4095>*\|all | Clears all IGMP statistics for the selected VLANs. |

Table 44 Layer 3 statistics menu options

| Command | Usage |
|---|---|
| ipclear | Clears IP statistics. Use this command with caution as it will delete all the IP statistics. |
| dump | Displays all Layer 3 statistics. |

## GEA Layer 3 statistics menu

Command: /stats/l3/geal3

```
[GEA Layer 3 Statistics Menu]
     l3bucket - Show GEA L3 bucket for an IP address
     dump     - Dump GEA layer 3 stats counter
```

The following table describes the Layer 3 GEA statistics menu options.

Table 45 Layer 3 GEA statistics menu options

| Command | Usage |
|---|---|
| l3bucket | Displays GEA statistics for a specific IP address. |
| Dump | Displays all GEA statistics. |

## GEA Layer 3 statistics

Command: /stats/l3/geal3/dump

```
GEA L3 statistics:
         Max L3 table size                 : 2048
         Number of L3 entries used         : 0

         Max LPM table size                : 256
         Number of LPM entries used        : 0
```

## IP statistics

Command: /stats/l3/ip

```
IP statistics:
ipInReceives: 36475            ipInHdrErrors: 0
ipInAddrErrors: 905
ipInUnknownProtos: 0           ipInDiscards: 0
ipInDelivers: 4103             ipOutRequests: 30974
ipOutDiscards: 0
ipDefaultTTL: 255
```

The following table describes the IP statistics:

Table 46 IP statistics

| Statistics | Description |
|---|---|
| ipInReceives | The total number of input datagrams received from interfaces, including those received in error. |
| ipInHdrErrors | The number of input datagrams discarded due to errors in their IP headers, including bad checksums, version number mismatch, other format errors, time-to-live exceeded, errors discovered in processing their IP options, and so on. |
| ipInAddrErrors | The number of input datagrams discarded because the IP address in their IP header destination field was not a valid address to be received at this switch. This count includes invalid addresses (for example, 0.0.0.0) and addresses of unsupported classes (for example, Class E).<br>For entities which are not IP gateways and therefore do not forward datagrams, this counter includes datagrams discarded because the destination address was not a local address. |
| ipInUnknownProtos | The number of locally addressed datagrams received successfully but discarded because of an unknown or unsupported protocol. |

Table 46 IP statistics

| Statistics | Description |
|---|---|
| ipInDiscards | The number of input IP datagrams for which no problems were encountered to prevent their continued processing, but which were discarded (for example, for lack of buffer space).<br>This counter does not include any datagrams discarded while awaiting re-assembly. |
| ipInDelivers | The total number of input datagrams successfully delivered to IP user-protocols (including ICMP). |
| ipOutRequests | The total number of IP datagrams that local IP user-protocols (including ICMP) supplied to IP in requests for transmission.<br>This counter does not include any datagrams counted in ipForwDatagrams. |
| ipOutDiscards | The number of output IP datagrams for which no problem was encountered to prevent their transmission to their destination, but which were discarded (for example, for lack of buffer space).<br>This counter would include datagrams counted in ipForwDatagrams if any such packets met this (discretionary) discard criterion. |
| ipDefaultTTL | The default value inserted into the Time-To-Live (TTL) field of the IP header of datagrams originated at this switch, whenever a TTL value is not supplied by the transport layer protocol. |

## ARP statistics

Command: `/stats/l3/arp`

```
ARP statistics:
arpEntriesCur:              2  arpEntriesHighWater:          4
```

The following table describes the Address Resolution Protocol (ARP) statistics:

Table 47 ARP statistics

| Statistic | Description |
|---|---|
| arpEntriesCur | The total number of outstanding ARP entries in the ARP table. |
| arpEntriesHighWater | The highest number of ARP entries ever recorded in the ARP table. |

## DNS statistics

Command: `/stats/l3/dns`

```
DNS statistics:
dnsInRequests:              0  dnsOutRequests:             0
dnsBadRequests:             0
```

The following table describes the Domain Name System (DNS) statistics:

Table 48 DNS statistics

| Statistic | Description |
|---|---|
| dnsInRequests | The total number of DNS request packets that have been received. |
| dnsOutRequests | The total number of DNS response packets that have been transmitted. |
| dnsBadRequests | The total number of DNS request packets received that were dropped. |

# ICMP statistics

Command: `/stats/l3/icmp`

```
ICMP statistics:
icmpInMsgs:              245802   icmpInErrors:               1393
icmpInDestUnreachs:          41   icmpInTimeExcds:               0
icmpInParmProbs:              0   icmpInSrcQuenchs:              0
icmpInRedirects:              0   icmpInEchos:                  18
icmpInEchoReps:          244350   icmpInTimestamps:              0
icmpInTimestampReps:          0   icmpInAddrMasks:               0
icmpInAddrMaskReps:           0   icmpOutMsgs:              253810
icmpOutErrors:                0   icmpOutDestUnreachs:          15
icmpOutTimeExcds:             0   icmpOutParmProbs:              0
icmpOutSrcQuenchs:            0   icmpOutRedirects:              0
icmpOutEchos:            253777   icmpOutEchoReps:              18
icmpOutTimestamps:            0   icmpOutTimestampReps:          0
icmpOutAddrMasks:             0   icmpOutAddrMaskReps:           0
```

The following table describes the Internet Control Messaging Protocol (ICMP) statistics:

Table 49 ICMP statistics

| Statistics | Description |
|---|---|
| `icmpInMsgs` | The total number of ICMP messages which the switch received. Note that this counter includes all those counted by icmpInErrors. |
| `icmpInErrors` | The number of ICMP messages which the switch received but determined as having ICMP specific errors (for example bad ICMP checksums and bad length). |
| `icmpInDestUnreachs` | The number of ICMP Destination Unreachable messages received. |
| `icmpInTimeExcds` | The number of ICMP Time Exceeded messages received. |
| `icmpInParmProbs` | The number of ICMP Parameter Problem messages received. |
| `icmpInSrcQuenchs` | The number of ICMP Source Quench (buffer almost full, stop sending data) messages received. |
| `icmpInRedirects` | The number of ICMP Redirect messages received. |
| `icmpInEchos` | The number of ICMP Echo (request) messages received. |
| `icmpInEchoReps` | The number of ICMP Echo Reply messages received. |
| `icmpInTimestamps` | The number of ICMP Timestamp (request) messages received. |
| `icmpInTimestampReps` | The number of ICMP Timestamp Reply messages received. |
| `icmpInAddrMasks` | The number of ICMP Address Mask Request messages received. |
| `icmpInAddrMaskReps` | The number of ICMP Address Mask Reply messages received. |
| `icmpOutMsgs` | The total number of ICMP messages which this switch attempted to send. Note that this counter includes all those counted by icmpOutErrors. |
| `icmpOutErrors` | The number of ICMP messages that this switch did not send due to problems discovered within ICMP such as a lack of buffer. This value should not include errors discovered outside the ICMP layer such as the inability of IP to route the resultant datagram. In some implementations there may be no types of errors that contribute to this counter's value. |
| `icmpOutDestUnreachs` | The number of ICMP Destination Unreachable messages sent. |
| `icmpOutTimeExcds` | The number of ICMP Time Exceeded messages sent. |
| `icmpOutParmProbs` | The number of ICMP Parameter Problem messages sent. |
| `icmpOutSrcQuenchs` | The number of ICMP Source Quench (buffer almost full, stop sending data) messages sent. |
| `icmpOutRedirects` | The number of ICMP Redirect messages sent. |
| `icmpOutEchos` | The number of ICMP Echo (request) messages sent. |
| `icmpOutEchoReps` | The number of ICMP Echo Reply messages sent. |
| `icmpOutTimestamps` | The number of ICMP Timestamp (request) messages sent. |
| `icmpOutTimestampReps` | The number of ICMP Timestamp Reply messages sent. |
| `icmpOutAddrMasks` | The number of ICMP Address Mask Request messages sent. |
| `icmpOutAddrMaskReps` | The number of ICMP Address Mask Reply messages sent. |

# TCP statistics

Command: `/stats/l3/tcp`

```
TCP statistics:
tcpRtoAlgorithm:         4   tcpRtoMin:               0
tcpRtoMax:          240000   tcpMaxConn:            512
tcpActiveOpens:     252214   tcpPassiveOpens:         7
tcpAttemptFails:       528   tcpEstabResets:          4
tcpInSegs:          756401   tcpOutSegs:         756655
tcpRetransSegs:          0   tcpInErrs:               0
tcpCurBuff:              0   tcpCurConn:              3
tcpOutRsts:            417
```

The following table describes the Transmission Control Protocol (TCP) statistics:

Table 50 TCP statistics

| Statistics | Description |
|---|---|
| `tcpRtoAlgorithm` | The algorithm used to determine the timeout value used for retransmitting unacknowledged octets. |
| `tcpRtoMin` | The minimum value permitted by a TCP implementation for the retransmission timeout, measured in milliseconds. More refined semantics for objects of this type depend upon the algorithm used to determine the retransmission timeout. In particular, when the timeout algorithm is rsre(3), an object of this type has the semantics of the LBOUND quantity described in Request For Comments (RFC) 793. |
| `tcpRtoMax` | The maximum value permitted by a TCP implementation for the retransmission timeout, measured in milliseconds. More refined semantics for objects of this type depend upon the algorithm used to determine the retransmission timeout. In particular, when the timeout algorithm is rsre(3), an object of this type has the semantics of the UBOUND quantity described in RFC 793. |
| `tcpMaxConn` | The limit on the total number of TCP connections the switch can support. In entities where the maximum number of connections is dynamic, this object should contain the value -1. |
| `tcpActiveOpens` | The number of times TCP connections have made a direct transition to the SYN-SENT state from the CLOSED state. |
| `tcpPassiveOpens` | The number of times TCP connections have made a direct transition to the SYN-RCVD state from the LISTEN state. |
| `tcpAttemptFails` | The number of times TCP connections have made a direct transition to the CLOSED state from either the SYN-SENT state or the SYN-RCVD state, plus the number of times TCP connections have made a direct transition to the LISTEN state from the SYN-RCVD state. |
| `tcpEstabResets` | The number of times TCP connections have made a direct transition to the CLOSED state from either the ESTABLISHED state or the CLOSE- WAIT state. |
| `tcpInSegs` | The total number of segments received, including those received in error. This count includes segments received on currently established connections. |
| `tcpOutSegs` | The total number of segments sent, including those on current connections but excluding those containing only retransmitted octets. |
| `tcpRetransSegs` | The total number of segments retransmitted, that is, the number of TCP segments transmitted containing one or more previously transmitted octets. |
| `tcpInErrs` | The total number of segments received in error (for example, bad TCP checksums). |
| `tcpCurBuff` | The total number of outstanding memory allocations from heap by TCP protocol stack. |
| `tcpCurConn` | The total number of outstanding TCP sessions that are currently opened. |
| `tcpOutRsts` | The number of TCP segments sent containing the reset (RST) flag. |

## UDP statistics

Command: `/stats/l3/udp`

```
UDP statistics:
udpInDatagrams:         54   udpOutDatagrams:         43
udpInErrors:             0   udpNoPorts:         1578077
```

The following table describes the User Datagram Protocol (UDP) statistics:

Table 51 UDP statistics

| Statistics | Description |
|---|---|
| udpInDatagrams | The total number of UDP datagrams delivered to the switch. |
| udpOutDatagrams | The total number of UDP datagrams sent from this switch. |
| udpInErrors | The number of received UDP datagrams that could not be delivered for reasons other than the lack of an application at the destination port. |
| udpNoPorts | The total number of received UDP datagrams for which there was no application at the destination port. |

## IGMP Multicast Group statistics

Command: `/stats/l3/igmp`

```
Enter VLAN number:  (1-4095) 1
------------------------------------------------------------
IGMP Snoop vlan 1 statistics:
------------------------------------------------------------
rxIgmpValidPkts:         0    rxIgmpInvalidPkts:             0
rxIgmpGenQueries:        0    rxIgmpGrpSpecificQueries:      0
rxIgmpLeaves:            0    rxIgmpReports:                 0
txIgmpReports:           0    txIgmpGrpSpecificQueries:      0
txIgmpLeaves:            0
```

This menu option enables you to display statistics regarding the use of the IGMP Multicast Groups.

The following table describes the IGMP statistics:

Table 52 IGMP statistics

| Statistic | Description |
|---|---|
| rxIgmpValidPkts | Total number of valid IGMP packets received |
| rxIgmpInvalidPkts | Total number of invalid packets received |
| rxIgmpGenQueries | Total number of General Membership Query packets received |
| rxIgmpGrpSpecificQueries | Total number of Membership Query packets received from specific groups |
| rxIgmpLeaves | Total number of Leave requests received |
| rxIgmpReports | Total number of Membership Reports received |
| txIgmpReports | Total number of Membership reports transmitted |
| txIgmpGrpSpecificQueries | Total number of Membership Query packets transmitted to specific groups |
| txIgmpLeaves | Total number of Leave messages transmitted |

# Management Processor statistics

Command: `/stats/mp`

```
[MP-specific Statistics Menu]
      pkt     - Show Packet stats
      tcb     - Show All TCP control blocks in use
      ucb     - Show All UDP control blocks in use
      cpu     - Show CPU utilization
```

The following table describes the MP-specific Statistics Menu options:

Table 53 MP-specific Statistics Menu

| Command | Usage |
|---|---|
| `pkt` | Displays packet statistics, to check for leads and load. |
| `tcb` | Displays all Transmission Control Protocol (TCP) control blocks (TCB) that are in use. |
| `ucb` | Displays all User Datagram Protocol (UDP) control blocks (UCB) that are in use. |
| `cpu` | Displays CPU utilization for periods of up to 1, 4, and 64 seconds. |

# Packet statistics

Command: `/stats/mp/pkt`

```
Packet counts:
 allocs:          36692     frees:                       36692
 mediums:             0     mediums hi-watermark:            3
 jumbos:              0     jumbos hi-watermark:             0
 smalls:              0     smalls hi-watermark:             2
 failures:            0
```

The following table describes the packet statistics.

Table 54 MP specific packet statistics

| Description | Example statistic |
|---|---|
| allocs | Total number of packet allocations from the packet buffer pool by the TCP/IP protocol stack. |
| frees | Total number of times the packet buffers are freed (released) to the packet buffer pool by the TCP/IP protocol stack. |
| mediums | Total number of packet allocations with size between 128 to 1536 bytes from the packet buffer pool by the TCP/IP protocol stack. |
| mediums hi-watermark | The highest number of packet allocation with size between 128 to 1536 bytes from the packet buffer pool by the TCP/IP protocol stack. |
| jumbos | Total number of packet allocations with more than 1536 bytes from the packet buffer pool by the TCP/IP protocol stack. |
| jumbos hi-watermark | The highest number of packet allocation with more than 1536 bytes from the packet buffer pool by the TCP/IP protocol stack. |
| smalls | Total number of packet allocations with size less than 128 bytes from the packet buffer pool by the TCP/IP protocol stack. |
| smalls hi-watermark | The highest number of packet allocation with size less than 128 bytes from the packet buffer pool by the TCP/IP protocol stack. |
| failures | Total number of packet allocation failures from the packet buffer pool by the TCP/IP protocol stack. |

## TCP statistics

Command: `/stats/mp/tcb`

```
All TCP allocated control blocks:
10ad41e8:  0.0.0.0             0 <=> 0.0.0.0            80  listen
10ad5790:  47.81.27.5       1171 <=> 47.80.23.243       23  established
```

The following table describes the Transmission Control Protocol (TCP) control block (TCB) statistics shown in this example:

Table 55 MP specified TCP statistics

| Description | Example statistic |
|---|---|
| Memory | `10ad41e8/10ad5790` |
| Destination IP address | `0.0.0.0/47.81.27.5` |
| Destination port | `0/1171` |
| Source IP | `0.0.0.0/47.80.23.243` |
| Source port | `80/23` |
| State | `listen/established` |

## UDP statistics

Command: `/stats/mp/ucb`

```
All UDP allocated control blocks:
  161:  listen
```

The following table describes the User Datagram Protocol (UDP) control block (UCB) statistics shown in this example:

Table 56 UDP statistics

| Description | Example Statistic |
|---|---|
| Control block | `161` |
| State | `listen` |

## CPU statistics

Command: `/stats/mp/cpu`

```
CPU utilization:
cpuUtil1Second:            8%
cpuUtil4Seconds:           9%
cpuUtil64Seconds:          8%
```

The following table describes the management port CPU utilization statistics:

Table 57 CPU statistics

| Statistics | Description |
|---|---|
| `cpuUtil1Second` | The utilization of MP CPU over 1 second. This is shown as a percentage. |
| `cpuUtil4Seconds` | The utilization of MP CPU over 4 seconds. This is shown as a percentage. |
| `cpuUtil64Seconds` | The utilization of MP CPU over 64 seconds. This is shown as a percentage. |

# SNMP statistics

Command: `/stats/snmp`

```
SNMP statistics:
snmpInPkts:                 54   snmpInBadVersions:              0
snmpInBadC'tyNames:          0   snmpInBadC'tyUses:              0
snmpInASNParseErrs:          0   snmpEnableAuthTraps:            0
snmpOutPkts:                54   snmpInBadTypes:                 0
snmpInTooBigs:               0   snmpInNoSuchNames:              0
snmpInBadValues:             0   snmpInReadOnlys:                0
snmpInGenErrs:               0   snmpInTotalReqVars:           105
snmpInTotalSetVars:          0   snmpInGetRequests:              2
snmpInGetNexts:             52   snmpInSetRequests:              0
snmpInGetResponses:          0   snmpInTraps:                    0
snmpOutTooBigs:              0   snmpOutNoSuchNames:             2
snmpOutBadValues:            0   snmpOutReadOnlys:               0
snmpOutGenErrs:              0   snmpOutGetRequests:             0
snmpOutGetNexts:             0   snmpOutSetRequests:             0
snmpOutGetResponses:        54   snmpOutTraps:                   0
snmpSilentDrops:             0   snmpProxyDrops:                 0
```

The following table describes the Simple Network Management Protocol (SNMP) statistics:

Table 58 SNMP statistics

| Statistics | Description |
|---|---|
| `snmpInPkts` | The total number of messages delivered to the SNMP entity from the transport service. |
| `snmpInBadVersions` | The total number of SNMP messages, which were delivered to the SNMP protocol entity and were for an unsupported SNMP version. |
| `snmpInBadC'tyNames` | The total number of SNMP messages delivered to the SNMP entity that used an SNMP community name not known to the switch. |
| `snmpInBadC'tyUses` | The total number of SNMP messages delivered to the SNMP protocol entity that represented an SNMP operation which was not allowed by the SNMP community named in the message. |
| `snmpInASNParseErrs` | The total number of ASN.1 (Abstract Syntax Notation One) or BER (Basic Encoding Rules), errors encountered by the SNMP protocol entity when decoding SNMP messages received.<br>The Open Systems Interconnection (OSI) method of specifying abstract objects is called ASN.1 (Abstract Syntax Notation One, defined in X.208), and one set of rules for representing such objects as strings of ones and zeros is called the BER (Basic Encoding Rules, defined in X.209).<br>ASN.1 is a flexible notation that allows one to define a variety of data types, from simple types such as integers and bit strings to structured types such as sets and sequences.<br>BER describes how to represent or encode values of each ASN.1 type as a string of eight-bit octets. |
| `snmpEnableAuthTraps` | An object to enable or disable the authentication traps generated by this switch. |
| `snmpOutPkts` | The total number of SNMP messages which were passed from the SNMP protocol entity to the transport service. |
| `snmpInBadTypes` | The total number of SNMP messages which failed ASN.1 parsing. |
| `snmpInTooBigs` | The total number of SNMP Protocol Data Units (PDUs) that were delivered to the SNMP protocol entity and for which the value of the error-status field is too big. |
| `snmpInNoSuchNames` | The total number of SNMP Protocol Data Units (PDUs) that were delivered to the SNMP protocol entity and for which the value of the error-status field is noSuchName. |
| `snmpInBadValues` | The total number of SNMP Protocol Data Units (PDUs) that were delivered to the SNMP protocol entity and for which the value of the error-status field is badValue. |

Table 58 SNMP statistics

| Statistics | Description |
|---|---|
| snmpInReadOnlys | The total number of valid SNMP Protocol Data Units (PDUs), which were delivered to the SNMP protocol entity and for which the value of the error-status field is read-only.<br>It should be noted that it is a protocol error to generate an SNMP PDU, which contains the value read-only in the error-status field. As such, this object is provided as a means of detecting incorrect implementations of the SNMP. |
| snmpInGenErrs | The total number of SNMP Protocol Data Units (PDUs), which were delivered to the SNMP protocol entity and for which the value of the error-status field is genErr. |
| snmpInTotalReqVars | The total number of MIB objects which have been retrieved successfully by the SNMP protocol entity as a result of receiving valid SNMP Get-Request and Get-Next Protocol Data Units (PDUs). |
| snmpInTotalSetVars | The total number of MIB objects, which have been altered successfully by the SNMP protocol entity as a result of receiving valid SNMP Set-Request Protocol Data Units (PDUs). |
| snmpInGetRequests | The total number of SNMP Get-Request Protocol Data Units (PDUs), which have been accepted and processed by the SNMP protocol entity. |
| snmpInGetNexts | The total number of SNMP Get-Next Protocol Data Units (PDUs), which have been accepted and processed by the SNMP protocol entity. |
| snmpInSetRequests | The total number of SNMP Set-Request Protocol Data Units (PDUs), which have been accepted and processed by the SNMP protocol entity. |
| snmpInGetResponses | The total number of SNMP Get-Response Protocol Data Units (PDUs), which have been accepted and processed by the SNMP protocol entity. |
| snmpInTraps | The total number of SNMP Trap Protocol Data Units (PDUs), which have been accepted and processed by the SNMP protocol entity. |
| snmpOutTooBigs | The total number of SNMP Protocol Data Units (PDUs), which were generated by the SNMP protocol entity and for which the value of the error-status field is too big. |
| snmpOutNoSuchNames | The total number of SNMP Protocol Data Units (PDUs), which were generated by the SNMP protocol entity and for which the value of the error-status is noSuchName. |
| snmpOutBadValues | The total number of SNMP Protocol Data Units (PDUs), which were generated by the SNMP protocol entity and for which the value of the error-status field is badValue. |
| snmpOutReadOnlys | Not in use. |
| snmpOutGenErrs | The total number of SNMP Protocol Data Units (PDUs), which were generated by the SNMP protocol entity and for which the value of the error-status field is genErr. |
| snmpOutGetRequests | The total number of SNMP Get-Request Protocol Data Units (PDUs), which have been generated by the SNMP protocol entity. |
| snmpOutGetNexts | The total number of SNMP Get-Next Protocol Data Units (PDUs), which have been generated by the SNMP protocol entity. |
| snmpOutSetRequests | The total number of SNMP Set-Request Protocol Data Units (PDUs), which have been generated by the SNMP protocol entity. |
| snmpOutGetResponses | The total number of SNMP Get-Response Protocol Data Units (PDUs), which have been generated by the SNMP protocol entity. |
| snmpOutTraps | The total number of SNMP Trap Protocol Data Units (PDUs), which have been generated by the SNMP protocol entity. |
| snmpSilentDrops | The total number of GetRequest-PDUs, GetNextRequest-PDUs,GetBulkRequest-PDUs, SetRequest-PDUs, and InformRequest-PDUs delivered to the SNMP entity which were silently dropped because the size of a reply containing an alternate Response-PDU with an empty variable-bindings field was too large. |
| snmpProxyDrops | The total number of GetRequest-PDUs, GetNextRequest-PDUs,GetBulkRequest-PDUs, SetRequest-PDUs, and InformRequest-PDUs delivered to the SNMP entity which were silently dropped because the transmission of the message to a proxy target failed in a manner (other than a time-out) such that no Response-PDU could be returned. |

# NTP statistics

Command: `/stats/ntp`

```
NTP statistics:
        Primary Server:
                Requests Sent:               17
                Responses Received:          17
                Updates:                     1
        Secondary Server:
                Requests Sent:               0
                Responses Received:          0
                Updates:                     0
        Last update based on response from primary server.
        Last update time: 18:04:16 Tue Mar 13, 2006
        Current system time: 18:55:49 Tue Mar 13, 2006
```

The switch uses NTP (Network Timing Protocol) version 3 to synchronize the switch's internal clock with an atomic time-calibrated NTP server. With NTP enabled, the switch can accurately update its internal clock to be consistent with other devices on the network and generates accurate syslogs.

The following table describes the NTP statistics:

Table 59 NTP statistics

| Statistics | Description |
|---|---|
| `Primary Server` | Requests Sent: The total number of NTP requests the switch sent to the primary NTP server to synchronize time.<br>Responses Received: The total number of NTP responses received from the primary NTP server.<br>Updates: The total number of times the switch updated its time based on the NTP responses received from the primary NTP server. |
| `Secondary Server` | Requests Sent: The total number of NTP requests the switch sent to the secondary NTP server to synchronize time.<br>Responses Received: The total number of NTP responses received from the secondary NTP server.<br>Updates: The total number of times the switch updated its time based on the NTP responses received from the secondary NTP server. |
| `Last update based on response from primary server` | Last update of time on the switch based on either primary or secondary NTP response received. |
| `Last update time` | The time stamp showing the time when the switch was last updated. |
| `Current system time` | The switch system time when the command `/stats/ntp` was issued. |

## Uplink Failure Detection statistics

This menu option allows you to display Uplink Failure Detection (UFD) statistics. To reset UFD statistics, follow the command `/stats/ufd` with the following argument: `clear`.

Command: `/stats/ufd <clear>`

```
Uplink Failure Detection statistics:
FDP number: 1
Number of times LtM link failure: 1
Number of times LtM link in Blocking State: 0
Number of times LtD got auto disabled: 1
FDP number: 2
Number of times LtM link failure: 1
Number of times LtM link in Blocking State: 0
Number of times LtD got auto disabled: 1
FDP number: 3
Number of times LtM link failure: 1
Number of times LtM link in Blocking State: 0
Number of times LtD got auto disabled: 1
FDP number: 4
Number of times LtM link failure: 1
Number of times LtM link in Blocking State: 0
Number of times LtD got auto disabled: 1
```

The following table describes the Uplink Failure Detection (UFD) statistics:

Table 60 Uplink Failure Detection statistics

| Statistic | Description |
|---|---|
| `Number of times LtM link failure` | The total numbers of times that link failures were detected on the uplink ports in the Link to Monitor group. |
| `Number of times LtM link in Blocking State` | The total number of times that Spanning Tree Blocking state was detected on the uplink ports in the Link to Monitor group. |
| `Number of times LtD got auto disabled` | The total numbers of times that downlink ports in the Link to Disable group were automatically disabled because of a failure in the Link to Monitor group. |

## Statistics dump

Command: `/stats/dump`

Use the dump command to dump all switch statistics available from the Statistics Menu (40K or more, depending on your configuration). This data can be used to tune or debug switch performance.

If you want to capture dump data to a file, set your communication software on your workstation to capture session data prior to issuing the dump commands.

# Configuration Menu

## Introduction

The Configuration Menu is only available from an administrator login. It includes submenus for configuring every aspect of the switch. Changes to configuration are not active until explicitly applied. Changes can be saved to flash memory.

## Menu information

Command: `/cfg`

```
[Configuration Menu]
     sys      - System-wide Parameter Menu
     port     - Port Menu
     l2       - Layer 2 Menu
     l3       - Layer 3 Menu
     rmon     - RMON Menu
     pmirr    - Port Mirroring Menu
     ufd      - Uplink Failure Detection Menu
     dump     - Dump current configuration to script file
     ptcfg    - Backup current configuration to FTP/TFTP server
     gtcfg    - Restore current configuration from FTP/TFTP server
     cur      - Display current configuration
```

The following table describes the Configuration Menu options.

Table 61 Configuration Menu options

| Command | Usage |
|---|---|
| `sys` | Displays the System Configuration Menu. |
| `port <port number>` | Displays the Port Configuration Menu. |
| `l2` | Displays the Layer 2 Configuration Menu. |
| `l3` | Displays the Layer 3 Configuration Menu. |
| `rmon` | Displays the RMON Configuration Menu. |
| `pmirr` | Displays the Mirroring Configuration Menu. |
| `ufd` | Displays the Uplink Failure Detection Configuration Menu. |
| `dump` | Dumps current configuration to a script file. |
| `ptcfg <host name or IP address of FTP/TFTP server> <filename on host>` | Backs up current configuration to FTP/TFTP server. |
| `gtcfg <host name or IP address of FTP/TFTP server> <filename on host>` | Restores current configuration from FTP/TFTP server. |
| `cur` | Displays the current configuration parameters. |

## Viewing, applying, reverting, and saving changes

As you use the configuration menus to set switch parameters, the changes you make do not take effect immediately. All changes are considered pending until you explicitly apply them. Also, any changes are lost the next time the switch boots unless the changes are explicitly saved.

While configuration changes are in the pending state, you can:

- View the pending changes
- Apply the pending changes
- Revert to restore configuration parameters set with the last apply command
- Save the changes to flash memory

# Viewing pending changes

You can view all pending configuration changes by entering `diff` at any CLI prompt:

```
# diff
```

You can view all pending configuration changes that have been applied but not saved to flash memory by entering `diff flash` at any CLI prompt:

```
# diff flash
```

# Applying pending changes

To make your configuration changes active, you must apply them. To apply configuration changes, enter the following command at any prompt:

```
# apply
```

NOTE: All configuration changes take effect immediately when applied.

# Reverting changes

The revert command removes configuration changes that have been made, but not applied. Enter `revert apply` to remove all changes that have not been saved:

```
# revert
```

# Saving the configuration

In addition to applying the configuration changes, you can save them to flash memory on the switch.

IMPORTANT: If you do not save the changes, they will be lost the next time the system is rebooted.

To save the new configuration, enter the following command at any prompt:

```
# save
```

When you save configuration changes, the changes are saved to the active configuration block. The configuration being replaced by the save is first copied to the backup configuration block. If you do not want the previous configuration block copied to the backup configuration block, enter the following instead:

```
# save n
```

You can decide which configuration you want to run the next time you reset the switch. Your options include:

- The active configuration block
- The backup configuration block
- Factory default configuration block

You can view all pending configuration changes that have been applied but not saved to flash memory using the diff flash command. It is a global command that can be executed from any prompt.

For instructions on selecting the configuration to run at the next system reset, see the “Selecting a configuration block” section in the “Boot Options Menu” chapter.

# Reminders

CLI reminders prompt users to complete configuration tasks that require multiple steps. The default setting for CLI reminders is `enabled`. Use the following command to disable CLI reminders: `/cfg/sys/reminders dis`

The following is an example of a configuration task performed with CLI reminders enabled.

```
>> Layer 2# vlan 5
VLAN number 5 with name "VLAN 5" created.
Reminder: VLAN 5 needs to be enabled.
>> VLAN 5# add 9
Port 9 is an UNTAGGED port and its current PVID is 1.
Confirm changing PVID from 1 to 5 [y/n]: y
Current ports for VLAN 5:        empty
Pending new ports for VLAN 5:    9
Reminder: Port 9 needs to be enabled.
Reminder: VLAN 5 needs to be enabled.
```

# System configuration

Command: `/cfg/sys`

```
[System Menu]
     syslog    - Syslog Menu
     sshd      - SSH Server Menu
     radius    - RADIUS Authentication Menu
     tacacs+   - TACACS+ Authentication Menu
     ntp       - NTP Server Menu
     ssnmp     - System SNMP Menu
     access    - System Access Menu
     date      - Set system date
     time      - Set system time
     timezone  - Set system timezone (daylight savings)
     olddst    - Set system DST for US
     dlight    - Set system daylight savings
     idle      - Set timeout for idle CLI sessions
     notice    - Set login notice
     bannr     - Set login banner
     hprompt   - Enable/disable display hostname (sysName) in CLI prompt
     bootp     - Enable/disable use of BOOTP
     dhcp      - Enable/disable use of DHCP on Mgmt interface
     reminders - Enable/disable Reminders
     cur       - Display current system-wide parameters
```

This menu provides configuration of switch management parameters such as user and administrator privilege mode passwords, browser-based management settings, and management access list.

The following table describes the System Configuration Menu options.

Table 62 System Configuration Menu options

| Command | Usage |
|---|---|
| `syslog` | Displays the Syslog Menu. |
| `sshd` | Displays the SSH Server Menu. |
| `radius` | Displays the RADIUS Authentication Menu. |
| `tacacs+` | Displays the TACACS+ Authentication Menu. |
| `ntp` | Displays the Network Time Protocol (NTP) Server Menu. |
| `ssnmp` | Displays the System SNMP Menu. |
| `access` | Displays the System Access Menu. |
| `date` | Prompts the user for the system date. |
| `time` | Configures the system time using a 24-hour clock format. |
| `timezone` | Configures the time zone where the switch resides. You are prompted to select your location (continent, country, region) by the timezone wizard. Once a region is selected, the switch updates the time to reflect local changes to Daylight Savings Time, etc. |

Table 62 System Configuration Menu options

| Command | Usage |
|---|---|
| `dlight disable\|enable` | Disables or enables daylight saving time in the system clock. When enabled, the switch will add an extra hour to the system clock so that it is consistent with the local clock. By default, this option is disabled. |
| `idle <1-60>` | Sets the idle timeout for CLI sessions, from 1 to 60 minutes. The default is 5 minutes.<br>This setting affects both the console port and Telnet port. |
| `notice <1-1024 character multi-line> <'-' to end>` | Displays login notice immediately before the "Enter password:" prompt. This notice can contain up to 1024 characters and new lines. |
| `bannr <1-80 characters>` | Configures a login banner of up to 80 characters. When a user or administrator logs into the switch, the login banner is displayed. It is also displayed as part of the output from the `/info/sys/gen` command. |
| `hprompt disable\|enable` | Enables or disables displaying of the host name (system administrator's name) in the command line interface.The default value is disabled. |
| `bootp disable\|enable` | Enables or disables the use of BOOTP. If you enable BOOTP, the switch will query its BOOTP server for setting the IP parameters on interface 1. The IP address obtained from the BOOTP server overrides the static IP address. The default value is `enabled`. |
| `dhcp disable\|enable` | Enables or disables Dynamic Host Control Protocol for setting the management IP address on interface 256. When enabled, the IP address obtained from the DHCP server overrides the static IP address. The default value is `enabled`. |
| `reminders disable\|enable` | Enables or disables reminder messages in the CLI. The default value is `enabled`. |
| `cur` | Displays the current system parameters. |

# System host log configuration

Command: `/cfg/sys/syslog`

```
[Syslog Menu]
     host     - Set IP address of first syslog host
     host2    - Set IP address of second syslog host
     sever    - Set the severity of first syslog host
     sever2   - Set the severity of second syslog host
     facil    - Set facility of first syslog host
     facil2   - Set facility of second syslog host
     console  - Enable/disable console output of syslog messages
     log      - Enable/disable syslogging of features
     cur      - Display current syslog settings
```

The following table describes the Syslog Configuration Menu options.

Table 63 Syslog Configuration Menu options

| Command | Description |
|---|---|
| `host <IP address>` | Sets the IP address of the first syslog host. For example, 100.10.1.1 |
| `host2 <IP address>` | Sets the IP address of the second syslog host. For example,<br>100.10.1.2 |
| `sever <1-7>` | Sets the severity level of the first syslog host displayed. The default is 7, which means log all the severity levels. |
| `sever2 <1-7>` | Sets the severity level of the second syslog host displayed. The default is 7, which means log all the severity levels. |
| `facil <1-7>` | This option sets the facility level of the first syslog host displayed. The range is 0-7. The default is 0. |
| `facil2 <1-7>` | This option sets the facility level of the second syslog host displayed. The range is 0-7. The default is 0. |

Table 63 Syslog Configuration Menu options

| Command | Description |
|---|---|
| `console disable\|enable` | Enables or disables delivering syslog messages to the console. When necessary, disabling console ensures the switch is not affected by syslog messages. It is enabled by default. |
| `log <feature\|all> <enable\|disable>` | Displays a list of features for which syslog messages can be generated. You can choose to enable/disable specific features or enable/disable syslog on all available features. Features include:<br>• console<br>• system<br>• mgmt<br>• cli<br>• stg<br>• vlan<br>• ssh<br>• ntp<br>• ip<br>• web<br>• rmon<br>• ufd<br>• cfg |
| `cur` | Displays the current syslog settings. |

## Secure Shell Server configuration

Command: `/cfg/sys/sshd`

```
[SSHD Menu]
      interval- Set Interval for generating the RSA server key
      scpadm  - Set SCP-only admin password
      hkeygen - Generate the RSA host key
      skeygen - Generate the RSA server key
      sshport - Set SSH server port number
      ena     - Enable the SCP apply and save
      dis     - Disable the SCP apply and save
      on      - Turn SSH server ON
      off     - Turn SSH server OFF
      cur     - Display current SSH server configuration
```

Telnet traffic on the network is not secure. This menu enables Secure Shell (SSH) access from any SSH client. The SSH program securely logs into another computer over a network and executes commands in a secure environment. All data using SSH is encrypted.

Secure Shell can be configured on the switch using the console port only. The menu options do not display if you access the switch using Telnet or the Browser-based Interface (BBI).

NOTE: See the *Application Guide* for information on SSH.

The following table describes the SSHD Configuration Menu options.

Table 64 SSHD Configuration Menu options

| Command | Description |
|---|---|
| `intrval <0-24>` | Defines interval for auto-generating the RSA server key. The switch will auto-generate the RSA server key at the interval defined in this command. The value of zero (0) means the RSA server key auto-generation is disabled. If the switch has been busy performing any other key generation and the assigned time of interval expires, the RSA server will skip generating the key. |
| `scpadm` | Defines the administrator password that is for Secure Copy (SCP) only. The username for this SCP administrator is *scpadmin*.<br>Typically, SCP is used to copy files securely from one machine to another. In the switch, SCP is used to download and upload the switch configuration using secure channels. |
| `hkeygen` | Generates the RSA host keys manually. The switch creates this key automatically while configuring the switch with Secure Shell (SSH). But you can generate the key manually by using this command if you need to overwrite the key for security reasons. The command will take effect immediately without executing the apply command. |
| `skeygen` | Generates the RSA server key. The switch creates this key automatically while configuring the switch with Secure Shell (SSH). You can generate the key manually by using this command if you need to overwrite the key for security reasons. The command will take effect immediately without executing the apply command. |
| `sshport <TCP port number>` | Sets the SSH server port number. The default value is 22. |
| `ena` | Enables the SCP apply and save. |
| `dis` | Disables the SCP apply and save. This is the default for SCP. |
| `on` | Enables the SSH server. |
| `off` | Disables the SSH server. This is the default for the SSH server. |
| `cur` | Displays the current SSH server configuration. |

# RADIUS server configuration

Command: `/cfg/sys/radius`

```
[RADIUS Server Menu]
    prisrv   - Set primary RADIUS server address
    secsrv   - Set secondary RADIUS server address
    secret   - Set primary RADIUS server secret
    secret2  - Set secondary RADIUS server secret
    port     - Set RADIUS port
    retries  - Set RADIUS server retries
    timeout  - Set RADIUS server timeout
    telnet   - Enable/disable RADIUS backdoor for telnet/ssh/http/https
    secbd    - Enable/disable RADIUS secure backdoor for telnet/ssh/http/https
    on       - Turn RADIUS authentication ON
    off      - Turn RADIUS authentication OFF
    cur      - Display current RADIUS configuration
```

NOTE: See the *Application Guide* for information on RADIUS.

The following table describes the RADIUS Server Configuration Menu options.

Table 65 RADIUS Server Configuration Menu options

| Command | Description |
|---|---|
| `prisrv <IP address>` | Sets the primary RADIUS server address. |
| `secsrv <IP address>` | Sets the secondary RADIUS server address. |
| `secret <1-32 characters> \|none` | This is the shared secret between the switch and the RADIUS server(s). |
| `secret2 <1-32 characters> \|none` | This is the secondary shared secret between the switch and the RADIUS server(s). |
| `port <UDP port number>` | Enter the number of the User Datagram Protocol (UDP) port to be configured, between 1500-3000. The default is 1645. |
| `retries <1-3>` | Sets the number of failed authentication requests before switching to a different RADIUS server. The range is 1-3 requests The default is 3 requests. |
| `timeout <1-10>` | Sets the amount of time, in seconds, before a RADIUS server authentication attempt is considered to have failed. The range is 1-10 seconds. The default is 3 seconds. |
| `telnet enable\|disable` | Enables or disables the RADIUS back door for telnet/SSH/ HTTP/HTTPS. The default value is disabled. This command does not apply when secure backdoor (`secbd`) is enabled. |
| `secbd enable\|disable` | Enables or disables the RADIUS back door using secure password for telnet/SSH/ HTTP/HTTPS. The default value is disabled. This command does not apply when backdoor (`telnet`) is enabled. |
| `on` | Enables the RADIUS server. |
| `off` | Disables the RADIUS server. This is the default. |
| `cur` | Displays the current RADIUS server parameters. |

IMPORTANT: If RADIUS is enabled, you must login using RADIUS authentication when connecting via the console or Telnet/SSH/HTTP/HTTPS. Backdoor for console is always enabled, so you can connect using noradius and the administrator password even if the backdoor (`telnet`) or secure backdoor (`secbd`) are disabled.

If Telnet backdoor is enabled (`telnet ena`), type in `noradius` as a backdoor to bypass RADIUS checking, and use the administrator password to log into the switch. The switch allows this even if RADIUS servers are available.

If secure backdoor is enabled (`secbd ena`), type in `noradius` as a backdoor to bypass RADIUS checking, and use the administrator password to log into the switch. The switch allows this only if RADIUS servers are not available.

## TACACS+ server configuration

Command: `/cfg/sys/tacacs+`

```
[TACACS+ Server Menu]
prisrv  - Set IP address of primary TACACS+ server
secsrv  - Set IP address of secondary TACACS+ server
secret  - Set secret for primary TACACS+ server
secret2 - Set secret for secondary TACACS+ server
port    - Set TACACS+ port number
retries - Set number of TACACS+ server retries
timeout - Set timeout value of TACACS+ server retries
telnet  - Enable/disable TACACS+ back door for telnet/ssh/http/https
secbd  - Enable/disable TACACS+ secure backdoor for telnet/ssh/http/https
cmap    - Enable/disable TACACS+ new privilege level mapping
usermap - Set user privilege mappings
on      - Enable TACACS+ authentication
off     - Disable TACACS+ authentication
cur     - Display current TACACS+ settings
```

TACACS+ (Terminal Access Controller Access Control System) is an authentication protocol that allows a remote access server to forward a user's logon password to an authentication server to determine whether access can be allowed to a given system. TACACS+ and Remote Authentication Dial-In User Service (RADIUS) protocols are more secure than the TACACS encryption protocol. TACACS+ is described in RFC 1492.

TACACS+ protocol is more reliable than RADIUS, as TACACS+ uses the Transmission Control Protocol (TCP) whereas RADIUS uses the User Datagram Protocol (UDP). Also, RADIUS combines authentication and authorization in a user profile, whereas TACACS+ separates the two operations.

TACACS+ offers the following advantages over RADIUS as the authentication device:

- TACACS+ is TCP-based, so it facilitates connection-oriented traffic.
- It supports full-packet encryption, as opposed to password-only in authentication requests.
- It supports decoupled authentication, authorization, and accounting.

The following table describes the TACACS+ Server Configuration Menu options.

Table 66 TACACS+ Server Configuration Menu options

| Command | Description |
|---|---|
| `prisrv <IP address>` | Defines the primary TACACS+ server address. |
| `secsrv <IP address>` | Defines the secondary TACACS+ server address. |
| `secret <1-32 characters> \|none` | This is the shared secret between the switch and the TACACS+ server(s). |
| `secret2 <1-32 characters> \|none` | This is the secondary shared secret between the switch and the TACACS+ server(s). |
| `port <TCP port number>` | Enter the number of the TCP port to be configured, between 1 - 65000. The default is 49. |
| `retries <1-3>` | Sets the number of failed authentication requests before switching to a different TACACS+ server. The range is 1-3 requests. The default is 3 requests. |
| `timeout <4-15>` | Sets the amount of time, in seconds, before a TACACS+ server authentication attempt is considered to have failed. The range is 4-15 seconds. The default is 5 seconds. |
| `telnet enable\|disable` | Enables or disables the TACACS+ back door for telnet. The `telnet` command also applies to SSH/SCP connections and the Browser-based Interface (BBI). The default value is disabled. This command does not apply when secure backdoor (`secbd`) is enabled. |
| `secbd enable\|disable` | Enables or disables the TACACS+ back door using secure password for telnet/SSH/ HTTP/HTTPS. The default value is disabled. This command does not apply when backdoor (`telnet`) is enabled. |
| `cmap enable\|disable` | Enables or disables TACACS+ authorization-level mapping. The default value is `disabled`. |
| `usermap <0-15> user\|oper\|admin\|none` | Maps a TACACS+ authorization level to this switch user level. Enter a TACACS+ authorization level (0-15), followed by the corresponding this switch user level. |
| `On` | Enables the TACACS+ server. |
| `Off` | Disables the TACACS+ server. This is the default. |
| `Cur` | Displays current TACACS+ configuration parameters. |

IMPORTANT: If TACACS+ is enabled, you must login using TACACS+ authentication when connecting via the console or Telnet/SSH/HTTP/HTTPS. Backdoor for console is always enabled, so you can connect using `notacacs` and the administrator password even if the backdoor (`telnet`) or secure backdoor (`secbd`) are disabled.

If Telnet backdoor is enabled (`telnet ena`), type in `notacacs` as a backdoor to bypass TACACS+ checking, and use the administrator password to log into the switch. The switch allows this even if TACACS+ servers are available.

If secure backdoor is enabled (`secbd ena`), type in `notacacs` as a backdoor to bypass TACACS+ checking, and use the administrator password to log into the switch. The switch allows this only if TACACS+ servers are not available.

## NTP server configuration

Command: `/cfg/sys/ntp`

```
[NTP Server Menu]
     prisrv   - Set primary NTP server address
     secsrv   - Set secondary NTP server address
     intrval  - Set NTP server resync interval
     on       - Turn NTP service ON
     off      - Turn NTP service OFF
     cur      - Display current NTP configuration
```

This menu enables you to synchronize the switch clock to a Network Time Protocol (NTP) server. By default, this option is disabled.

The following table describes the NTP Server Configuration Menu options.

Table 67 NTP Server Configuration Menu options

| Command | Description |
|---|---|
| `prisrv <IP address>` | Configures the IP addresses of the primary NTP server to which you want to synchronize the switch clock. |
| `secsrv <IP address>` | Configures the IP addresses of the secondary NTP server to which you want to synchronize the switch clock. |
| `intrval <1-44640>` | Specifies the interval, that is, how often, in minutes (1-44640), to resynchronize the switch clock with the NTP server. The default is 1440 minutes. |
| `on` | Enables the NTP synchronization service. |
| `off` | Disables the NTP synchronization service. This is the default. |
| `cur` | Displays the current NTP service settings. |

## System SNMP configuration

Command: `/cfg/sys/ssnmp`

```
[SNMP Menu]
     snmpv3   - SNMPv3 Menu
     name     - Set SNMP "sysName"
     locn     - Set SNMP "sysLocation"
     cont     - Set SNMP "sysContact"
     rcomm    - Set SNMP read community string
     wcomm    - Set SNMP write community string
     timeout  - Set timeout for the SNMP state machine
     auth     - Enable/disable SNMP "sysAuthenTrap"
     linkt    - Enable/disable SNMP link up/down trap
     ufd      - Enable/disable SNMP Uplink Failure Detection trap
     cur      - Display current SNMP configuration
```

The switch software supports SNMP-based network management. In SNMP model of network management, a management station (client/manager) accesses a set of variables known as MIBs (Management Information Base) provided by the managed device (agent). If you are running an SNMP network management station on your network, you can manage the switch using the following standard SNMP MIBs:

- MIB II (RFC 1213)
- Ethernet MIB (RFC 1643)
- Bridge MIB (RFC 1493)

An SNMP agent is a software process on the managed device that listens on UDP port 161 for SNMP messages. Each SNMP message sent to the agent contains a list of management objects to retrieve or to modify.

- SNMP parameters that can be modified include:
- System name
- System location
- System contact
- Use of the SNMP system authentication trap function
- Read community string
- Write community string

The following table describes the System SNMP Configuration Menu options.

Table 68 System SNMP Configuration Menu options

| Command | Description |
|---|---|
| `snmpv3` | Displays SNMPv3 menu. |
| `name <1-64 characters>` | Configures the name for the system. The name can have a maximum of 64 characters. |
| `locn <1-64 characters>` | Configures the name of the system location. The location can have a maximum of 64 characters. |
| `cont <1-64 characters>` | Configures the name of the system contact. The contact can have a maximum of 64 characters. |
| `rcomm <1-32 characters>` | Configures the SNMP read community string. The read community string controls SNMP "get" access to the switch. It can have a maximum of 32 characters. The default read community string is *public*. |
| `wcomm <1-32 characters>` | Configures the SNMP write community string. The write community string controls SNMP "set" and "get" access to the switch. It can have a maximum of 32 characters. The default write community string is *private*. |
| `timeout <1-30>` | Sets the timeout value for the SNMP state machine. The range is 1-30 minutes. The default value is 5 minutes. |
| `auth disable\|enable` | Enables or disables the use of the system authentication trap facility. The default setting is disabled. |
| `linkt <port> disable\|enable` | Enables or disables the sending of SNMP link up and link down traps. The default setting is enabled. |
| `Ufd disable\|enable` | Enables or disables the sending of Uplink Failure Detection traps. The default setting is disabled. |
| `cur` | Displays the current SNMP configuration. |

## SNMPv3 configuration

Command: `/cfg/sys/ssnmp/snmpv3`

```
[SNMPv3 Menu]
     usm      - usmUser Table Menu
     view     - vacmViewTreeFamily Table Menu
     access   - vacmAccess Table Menu
     group    - vacmSecurityToGroup Table Menu
     comm     - community Table Menu
     taddr    - targetAddr Table Menu
     tparam   - targetParams Table Menu
     notify   - notify Table Menu
     v1v2     - Enable/disable V1/V2 access
     cur      - Display current SNMPv3 configuration
```

SNMP version 3 (SNMPv3) is an extensible SNMP Framework that supplements the SNMPv2 Framework by supporting the following:

- a new SNMP message format
- security for messages
- access control
- remote configuration of SNMP parameters

For more details on the SNMPv3 architecture please see RFC2271 to RFC2275.

The following table describes the SNMPv3 Configuration Menu options.

Table 69 SNMPv3 Configuration Menu options

| Command | Description |
|---|---|
| `usm <1-16>` | Configures a user security model (USM) entry for an authorized user. You can also configure this entry through SNMP. The range is 1-16. |
| `view <1-128>` | Configures different MIB views. The range is 1-128. |
| `access <1-32>` | Configures access rights. The View-based Access Control Model defines a set of services that an application can use for checking access rights of the user. You need access control when you have to process retrieval or modification request from an SNMP entity. The range is 1-32. |
| `group <1-16>` | Configures an SNMP group. A group maps the user name to the access group names and their access rights needed to access SNMP management objects. A group defines the access rights assigned to all names that belong to a particular group. The range is 1-16. |
| `comm <1-16>` | Configures a community table entry. The community table contains objects for mapping community strings and version-independent SNMP message parameters. The range is 1-16. |
| `taddr <1-16>` | Configures the destination address and user security levels for outgoing notifications. This is also called the transport endpoint. The range is 1-16. |
| `tparam <1-16>` | Configures SNMP parameters, consisting of message processing model, security model, security level, and security name information. There may be multiple transport endpoints associated with a particular set of SNMP parameters, or a particular transport endpoint may be associated with several sets of SNMP parameters. |
| `notify <1-16>` | Configures a notification index. A notification application typically monitors a system for particular events or conditions, and generates Notification-Class messages based on these events or conditions. The range is 1-16. |
| `v1v2 disable\|enable` | Enables or disables the access to SNMP version 1 and version 2. This command is enabled by default. |
| `cur` | Displays the current SNMPv3 configuration. |

## SNMPv3 User Security Model configuration

Command: `/cfg/sys/ssnmp/snmpv3/usm <usm number>`

```
[SNMPv3 usmUser 1  Menu]
     name     - Set USM user name
     auth     - Set authentication protocol
     authpw   - Set authentication password
     priv     - Set privacy protocol
     privpw   - Set privacy password
     del      - Delete usmUser entry
     cur      - Display current usmUser configuration
```

You can make use of a defined set of user identities using this Security Model. An SNMP engine must have the knowledge of applicable attributes of a user.

This menu helps you create a user security model entry for an authorized user. You need to provide a security name to create the USM entry.

The following table describes the User Security Model Configuration Menu options.

Table 70 User Security Model Configuration Menu options

| Command | Description |
|---|---|
| `name <1-32 characters>` | Configures a string up to 32 characters long that represents the name of the user. This is the login name that you need in order to access the switch. |

Table 70 User Security Model Configuration Menu options

| Command | Description |
|---|---|
| `auth md5\|sha\|none` | Configures the authentication protocol between HMAC-MD5-96 or HMAC-SHA-96. The default algorithm except usmUser 1-2 is `none`. |
| `authpw` | Configures your password for authentication. If you selected an authentication algorithm using the above command, you need to provide a password; otherwise you will get an error message during validation. |
| `priv des\|none` | Configures the type of privacy protocol on the switch. The privacy protocol protects messages from disclosure. The options are `des` (CBC-DES Symmetric Encryption Protocol) or `none`. If you specify `des` as the privacy protocol, then be sure that you have selected one of the authentication protocols (MD5 or HMAC-SHA-96). If you select `none` as the authentication protocol, you will get an error message. |
| `privpw` | Configures the privacy password. |
| `del` | Deletes the USM user entries. |
| `cur` | Displays the USM user entries. |

# SNMPv3 View configuration

Command: `/cfg/sys/ssnmp/snmpv3/view <view number>`

```
[SNMPv3 vacmViewTreeFamily 1 Menu]
  name     - Set view name
  tree     - Set MIB subtree(OID) which defines a family of view subtrees
  mask     - Set view mask
  type     - Set view type
  del      - Delete vacmViewTreeFamily entry
  cur      - Display current vacmViewTreeFamily configuration
```

The following table describes the SNMPv3 View Configuration Menu options.

Table 71 SNMPv3 View Configuration Menu options

| Command | Description |
|---|---|
| `name <1-32 characters>` | Defines the name for a family of view subtrees up to a maximum of 32 characters. |
| `tree <1-64 characters>` | Defines the Object Identifier (OID), a string of maximum 64 characters, which when combined with the corresponding mask defines a family of view subtrees.<br>An example of an OID is `1.3.6.1.2.1.1.1.0` |
| `mask <1-32 characters>` | Defines the bit mask, which in combination with the corresponding tree defines a family of view subtrees. The mask can have a maximum of 32 characters. |
| `type included\|excluded` | Selects whether the corresponding instances of `vacmViewTreeFamilySubtree` and `vacmViewTreeFamilyMask` define a family of view subtrees, which is included in or excluded from the MIB view. |
| `del` | Deletes the `vacmViewTreeFamily` group entry. |
| `cur` | Displays the current `vacmViewTreeFamily` configuration. |

# SNMPv3 View-based Access Control Model configuration

Command: `/cfg/sys/ssnmp/snmpv3/access <access number>`

```
[SNMPv3 vacmAccess 1  Menu]
     name      - Set group name
     model     - Set security model
     level     - Set minimum level of security
     rview     - Set read view index
     wview     - Set write view index
     nview     - Set notify view index
     del       - Delete vacmAccess entry
     cur       - Display current vacmAccess configuration
```

The view-based Access Control Model defines a set of services that an application can use for checking access rights of the user. Access control is needed when the user has to process SNMP retrieval or modification request from an SNMP entity.

The following table describes the User Access Control Configuration Menu options.

Table 72 View-based Access Control Configuration Menu options

| Command | Description |
|---|---|
| `name <1-32 characters>` | Defines the name of the group, up to a maximum of 32 characters. |
| `model usm\|snmpv1\|snmpv2` | Selects the security model to be used. |
| `level noAuthNoPriv\|authNoPriv\|authPriv` | Defines the minimum level of security required to gain access rights. The level `noAuthNoPriv` means that the SNMP message will be sent without authentication and without using a privacy protocol. The level `authNoPriv` means that the SNMP message will be sent with authentication but without using a privacy protocol. The `authPriv` means that the SNMP message will be sent both with authentication and using a privacy protocol. |
| `rview <1-32 characters>` | Defines a 32 character long read view name that allows you read access to a particular MIB view. If the value is empty or if there is no active MIB view having this value then no access is granted. |
| `wview <1-32 characters>` | Defines a 32 character long write view name that allows you write access to the MIB view. If the value is empty or if there is no active MIB view having this value then no access is granted. |
| `nview <1-32 characters>` | Defines a 32 character long notify view name that allows you notify access to the MIB view. |
| `del` | Deletes the View-based Access Control entry. |
| `cur` | Displays the View-based Access Control configuration. |

## SNMPv3 Group configuration

Command: `/cfg/sys/ssnmp/snmpv3/group <group number>`

```
[SNMPv3 vacmSecurityToGroup 1 Menu]
     model    - Set security model
     uname    - Set USM user name
     gname    - Set group name
     del      - Delete vacmSecurityToGroup entry
     cur      - Display current vacmSecurityToGroup configuration
```

The following table describes the SNMPv3 Group Configuration Menu options.

Table 73 SNMPv3 Group Configuration Menu options

| Command | Description |
|---|---|
| `model usm\|snmpv1\|snmpv2` | Defines the security model. |
| `uname <1-32 characters>` | Sets the user name as defined in `/cfg/sys/ssnmp/snmpv3/usm/name`. The user name can have a maximum of 32 characters. |
| `gname <1-32 characters>` | Configures the name for the access group as defined in `/cfg/sys/ssnmp/snmpv3/access/name`. The group name can have a maximum of 32 characters. |
| `del` | Deletes the `vacmSecurityToGroup` entry. |
| `cur` | Displays the current `vacmSecurityToGroup` configuration. |

## SNMPv3 Community Table configuration

Command: `/cfg/sys/ssnmp/snmpv3/comm <comm number>`

```
[SNMPv3 snmpCommunityTable 1  Menu]
     index    - Set community index
     name     - Set community string
     uname    - Set USM user name
     tag      - Set community tag
     del      - Delete communityTable entry
     cur      - Display current communityTable configuration
```

This command is used for configuring the community table entry. The configured entry is stored in the community table list in the SNMP engine. This table is used to configure community strings in the Local Configuration Datastore (LCD) of SNMP engine.

The following table describes the SNMPv3 Community Table Configuration Menu options.

Table 74 SNMPv3 Community Table Configuration Menu options

| Command | Description |
|---|---|
| `index <1-32 characters>` | Configures the unique index value of a row in this table. The index can have a maximum of 32 characters. |
| `name <1-32 characters>` | Defines a readable 32 characters string that represents the corresponding value of an SNMP community name in a security model. |
| `uname <1-32 characters>` | Defines the name as defined in `/cfg/sys/ssnmp/snmpv3/usm/name`. The name can have a maximum of 32 characters. |
| `tag <1-255 characters>` | Configures a tag of up to 255 characters maximum. This tag specifies a set of transport endpoints to which a command responder application sends an SNMP trap. |
| `del` | Deletes the community table entry. |
| `cur` | Displays the community table configuration. |

## SNMPv3 Target Address Table configuration

Command: `/cfg/sys/ssnmp/snmpv3/taddr <taddr number>`

```
[SNMPv3 snmpTargetAddrTable 1  Menu]
     name     - Set target address name
     addr     - Set target transport address IP
     port     - Set target transport address port
     taglist  - Set tag list
     pname    - Set targetParams name
     del      - Delete targetAddrTable entry
     cur      - Display current targetAddrTable configuration
```

This menu allows you to configure an entry of a transport address that transmits SNMP traps.

The following table describes the SNMPv3 Target Address Table Configuration Menu options.

Table 75 SNMPv3 Target Address Table Configuration Menu options

| Command | Description |
|---|---|
| `name <1-32 characters>` | Configures the locally arbitrary, but unique identifier, target address name associated with this entry. |
| `addr <transport address ip>` | Configures a transport address IP that can be used in the generation of SNMP traps. |
| `port <transport address port>` | Configures a transport address port that can be used in the generation of SNMP traps. |
| `taglist <1-255 characters>` | Configures a list of tags (up to 255 characters maximum) that are used to select target addresses for a particular operation. |
| `pname <1-32 characters>` | Defines the name as defined in /cfg/sys/ssnmp/snmpv3/tparam/name. |
| `del` | Deletes the Target Address Table entry. |
| `cur` | Displays the current Target Address Table configuration. |

## SNMPv3 Target Parameters Table configuration

Command: `/cfg/sys/ssnmp/snmpv3/tparam <tparam number>`

```
[SNMPv3 snmpTargetParamsTable 1  Menu]
     name     - Set targetParams name
     mpmodel  - Set message processing model
     model    - Set security model
     uname    - Set USM user name
     level    - Set minimum level of security
     del      - Delete targetParamsTable entry
     cur      - Display current targetParamsTable configuration
```

You can configure the target parameters entry and store it in the target parameters table in the SNMP engine. This table contains parameters that are used to generate a message. The parameters include the message processing model (for example: SNMPv3, SNMPv2c, SNMPv1), the security model (for example: USM), the security name, and the security level (`noAuthnoPriv`, `authNoPriv`, or `authPriv`).

The following table describes the SNMPv3 Target Parameters Table Configuration Menu options.

Table 76 SNMPv3 Target Parameters Table Configuration Menu options

| Command | Description |
|---|---|
| `name <1-32 characters>` | Configures the locally arbitrary, but unique identifier that is associated with this entry. |
| `mpmodel snmpv1\|snmpv2c\|snmpv3` | Configures the message processing model that is used to generate SNMP messages. |
| `model usm\|snmpv1\|snmpv2` | Selects the security model to be used when generating the SNMP messages. |
| `uname <1-32 characters>` | Defines the name that identifies the user in the USM table, on whose behalf the SNMP messages are generated using this entry. |
| `level noAuthNoPriv\|authNoPriv\|authPriv` | Selects the level of security to be used when generating the SNMP messages using this entry. The level `noAuthNoPriv` means that the SNMP message will be sent without authentication and without using a privacy protocol. The level `authNoPriv` means that the SNMP message will be sent with authentication but without using a privacy protocol. The `authPriv` means that the SNMP message will be sent both with authentication and using a privacy protocol. |
| `del` | Deletes the `targetParamsTable` entry. |
| `cur` | Displays the current `targetParamsTable` configuration. |

## SNMPv3 Notify Table configuration

Command: `/cfg/sys/ssnmp/snmpv3/notify <notify number>`

```
[SNMPv3 snmpNotifyTable 1  Menu]
     name     - Set notify name
     tag      - Set notify tag
     del      - Delete notifyTable entry
     cur      - Display current notifyTable configuration
```

SNMPv3 uses Notification Originator to send out traps. A notification typically monitors a system for particular events or conditions, and generates Notification-Class messages based on these events or conditions.

The following table describes the SNMPv3 Notify Table Configuration menu options.

Table 77 SNMPv3 Notify Table Configuration Menu options

| Command | Description |
|---|---|
| `name <1-32 characters>` | Defines a locally arbitrary but unique identifier associated with this SNMP notify entry. |
| `tag <1-255 characters>` | Defines a tag of 255 characters maximum that contains a tag value which is used to select entries in the Target Address Table. Any entry in the `snmpTargetAddrTable`, that matches the value of this tag, is selected. |
| `del` | Deletes the notify table entry. |
| `cur` | Displays the current notify table configuration. |

## System Access configuration

Command: `/cfg/sys/access`

```
[System Access Menu]
     mgmt     - Management Network Definition Menu
     user     - User Access Control Menu (passwords)
     http     - Enable/disable HTTP (Web) access
     https    - HTTPS Web Access Menu
     wport    - Set HTTP (Web) server port number
     snmp     - Set SNMP access control
     tnport   - Set Telnet server port number
     tport    - Set the TFTP Port for the system
     cur      - Display current system access configuration
```

The following table describes the System Access Configuration menu options.

Table 78 System Access Configuration Menu options

| Command | Description |
|---|---|
| `mgmt` | Displays the Management Configuration Menu. |
| `user` | Displays the User Access Control Menu. |
| `http disable\|enable` | Enables or disables HTTP (Web) access to the Browser-based Interface. It is enabled by default. |
| `https` | Displays the HTTPS Menu. |
| `wport <TCP port number>` | Sets the switch port used for serving switch Web content. The default is HTTP port 80. |
| `snmp disable\|read-only\|read-write` | Disables or provides read-only/write-read SNMP access. |
| `tnport <TCP port number>` | Sets an optional telnet server port number for cases where the server listens for telnet sessions on a non-standard port. The default is telnet port 23. |
| `tport <TFTP port number>` | Sets an optional TFTP server port number for cases where the server listens for TFTP sessions on a non-standard port. The default is TFTP port 69. |
| `cur` | Displays the current system access parameters. |

## Management Networks configuration

Command: `/cfg/sys/access/mgmt`

```
[Management Networks Menu]
     add      - Add mgmt network definition
     rem      - Remove mgmt network definition
     cur      - Display current mgmt network definitions
```

The following table describes the Management Networks Configuration menu options. You can configure up to 10 management networks on the switch.

Table 79 Management Networks Configuration menu options

| Command | Description |
|---|---|
| `add <IP address> <IP mask>` | Adds a defined network through which switch access is allowed through Telnet, SNMP, or the browser-based interface. A range of IP addresses is produced when used with a network mask address. Specify an IP address and mask address in dotted-decimal notation. |
| `rem <IP address> <IP mask>` | Removes a defined network, which consists of a management network address and a management network mask address. |
| `cur` | Displays the current management networks parameters. |

## User Access Control configuration

Command: `/cfg/sys/access/user`

```
[User Access Control Menu]
     uid      - User ID Menu
     eject    - Eject user
     usrpw    - Set user password (user)
     opw      - Set operator password (oper)
     admpw    - Set administrator password (admin)
     cur      - Display current user status
```

The following table describes the User Access Control menu options.

Table 80 User Access Control Configuration menu options

| Command | Description |
|---|---|
| `uid <1-10>` | Displays the User ID Menu for the selected user. |
| `eject <user-name>` | Ejects the selected user from the switch. |
| `usrpw <1-128 characters>` | Sets the user (`user`) password (maximum 128 characters). The user has no direct responsibility for switch management. He or she can view switch status information and statistics, but cannot make any configuration changes. |
| `opw <1-128 characters>` | Sets the operator (`oper`) password (maximum 128 characters). The operator manages all functions of the switch. He or she can view all switch information and statistics and can reset ports or the entire switch. |
| `admpw <1-128 characters>` | Sets the administrator (`admin`) password (maximum 128 characters). The super user administrator has complete access to all menus, information, and configuration commands on the switch, including the ability to change both the user and administrator passwords. |
| `cur` | Displays the current user status. |

## User ID configuration

Command: `/cfg/sys/access/user/uid <uid number>`

```
[User ID 1  Menu]
     cos      - Set class of service
     name     - Set user name
     pswd     - Set user password
     ena      - Enable user ID
     dis      - Disable user ID
     del      - Delete user ID
     cur      - Display current user configuration
```

The following table describes the User ID Configuration menu options.

Table 81 User ID Configuration menu options

| Command | Description |
|---|---|
| `cos <user\|oper\|admin>` | Sets the Class-of-Service to define the user's authority level. |
| `name <1-8 characters>` | Defines the user name. |
| `pswd <1-128 characters>` | Sets the user password of up to 128 characters maximum. |
| `ena` | Enables the user ID. |
| `dis` | Disables the user ID. |
| `del` | Deletes the user ID. |
| `cur` | Displays the current user ID parameters. |

## HTTPS Access configuration

Command: `/cfg/sys/access/https`

```
[https Menu]
     access   - Enable/Disable HTTPS Web access
     port     - HTTPS WebServer port number
     generate - Generate self-signed HTTPS server certificate
     certSave - save HTTPS certificate
     cur      - Display current SSL Web Access configuration
```

The following table describes the HTTPS Access Configuration menu options.

Table 82 HTTPS Access Configuration menu options

| Command | Description |
|---|---|
| `access enable\|disable` | Enables or disables BBI access (Web access) using HTTPS. The default value is `disabled`. |
| `port <TCP port number>` | Defines the HTTPS Web server port number. The default is 443. |
| `generate` | Allows you to generate a certificate to connect to the SSL to be used during the key exchange. A default certificate is created when HTTPS is enabled for the first time. The user can create a new certificate defining the information that they want to be used in the various fields. For example:<br>• Country Name (2 letter code) [ ]: JP<br>• State or Province Name (full name) [ ]: Tokyo<br>• Locality Name (for example, city) [ ]: Fuchu<br>• Organization Name (for example, company) [ ]: NEC<br>• Organizational Unit Name (for example, section) [ ]: SIGMABLADE<br>• Common Name (for example, user's name) [ ]: Taro<br>• Email (for example, email address) [ ]: info@nec.com<br>You must confirm if you want to generate the certificate. It takes approximately 30 seconds to generate the certificate. Then the switch restarts SSL agent. |
| `certSave` | Allows the client, or the Web browser, to accept the certificate and save the certificate to Flash to be used when the switch is rebooted. |
| `cur` | Displays the current SSL Web Access configuration. |

# Port configuration

Command: `/cfg/port <port number>`

```
[Port 1 Menu]
     gig      - Gig Phy Menu
     pvid     - Set default port VLAN id
     name     - Set port name
     rmon     - Enable/Disable RMON for port
     tag      - Enable/disable VLAN tagging for port
     tagpvid  - Enable/disable tagging on pvid
     ena      - Enable port
     dis      - Disable port
     cur      - Display current port configuration
```

This menu enables you to configure settings for individual switch ports. This command is enabled by default.

NOTE: Port 19 is a port for switch management interface (interface 256).

The following table describes the Port Configuration Menu options.

Table 83 Port Configuration Menu options

| Command | Description |
|---|---|
| `gig` | Displays theGigabit Ethernet Physical Link Menu. |
| `pvid <1-4095>` | Sets the default VLAN number which will be used to forward frames which are not VLAN tagged. The default number for all ports except Port 19 is 1.<br>**Note**: VLAN 4095 is a VLAN for switch management interface. |
| `name <1-64 characters>\|none` | Sets a name for the port (maximum 64 characters). The assigned port name displays next to the port number on some information and statistics screens. |
| `rmon enable\|disable` | Enables or disables Remote Monitoring for the port. The default is disabled. RMON must be enabled for any RMON configurations to function. |
| `tag enable\|disable` | Disables or enables VLAN tagging for this port. The default is disabled. |
| `tagpvid enable\|disable` | Disables or enables VLAN tag persistence. When disabled, the VLAN tag is removed from packets whose VLAN tag matches the port PVID. The default value is enabled. |
| `ena` | Enables the port. |
| `dis` | Disables the port. To temporarily disable a port without changing its configuration attributes, see the “Temporarily disabling a port” section later in this chapter. |
| `cur` | Displays current port parameters. |

## Temporarily disabling a port

To temporarily disable a port without changing its stored configuration attributes, enter the following command at any prompt:

```
Main# /oper/port <port number>/dis
```

Because this configuration sets a temporary state for the port, you do not need to use apply or save. The port state will revert to its original configuration when the switch is reset. See the “Menu information” section in the “Operations Menu” chapter for other operations-level commands.

## Port link configuration

Command: `/cfg/port <port number>/gig`

```
[Gigabit Link Menu]
      speed   - Set link speed
      mode    - Set full or half duplex mode
      fctl    - Set flow control
      auto    - Set auto negotiation
      cur     - Display current gig link configuration
```

Use these menu options to set port parameters for the port link.

Link menu options are described in the following table and display on the Gigabit port configuration menus for the switch. Using these configuration menus, you can set port parameters such as speed, duplex, flow control, and negotiation mode for the port link.

The following table describes the Gigabit Link Configuration Menu options.

Table 84 Gigabit Link Configuration Menu options

| Command | Description |
|---|---|
| `speed 10\|100\|1000\|any` | Sets the link speed. Not all options are valid on all ports. The choices include:<br>• 10 Mb/s<br>• 100 Mb/s<br>• 1000 Mb/s<br>• "any," for automatic detection (default)<br>Note: Ports 1-18 are set to 1000 Mb/s, and cannot be changed. |
| `mode full\|half\|any` | Sets the operating mode. Not all options are valid on all ports. The choices include:<br>• Full-duplex<br>• Half-duplex<br>• "Any," for automatic detection (default)<br>Note: Ports 1-16 are set to "Any" and Ports 17-18 are set to full duplex. These ports, and cannot be changed. |
| `fctl rx\|tx\|both\|none` | Sets the flow control. The choices include:<br>• Receive (rx) flow control<br>• Transmit (tx) flow control<br>• Both receive and transmit flow control (default)<br>• No flow control |
| `auto on\|off` | Enables or disables auto-negotiation for the port. The default is enabled. |
| `cur` | Displays current port parameters. |

# Layer 2 configuration

Command: `/cfg/l2`

```
[Layer 2 Menu]
     mrst     - Multiple Spanning Tree/Rapid Spanning Tree Menu
     stp      - Spanning Tree Menu
     fdb      - FDB
     trunk    - Trunk Group Menu
     thash    - IP Trunk Hash Menu
     lacp     - Link Aggregation Control Protocol Menu
     vlan     - VLAN Menu
     upfast   - Enable/disable Uplink Fast
     update   - UplinkFast station update rate
     cur      - Display current layer 2 parameters
```

The following table describes the Layer 2 Configuration Menu options.

Table 85 L2 Configuration Menu options

| Command | Description |
|---|---|
| `mrst` | Displays the Rapid Spanning Tree/Multiple Spanning Tree Protocol Configuration Menu. |
| `stp` | Displays the Spanning Tree Configuration Menu. |
| `fdb` | Displays the Forwarding Database Configuration Menu. |
| `trunk <1-12>` | Displays the Trunk Group Configuration Menu for the selected trunk (1-12). |
| `thash` | Displays the IP Trunk Hash Menu. |
| `lacp` | Displays the Link Aggregation Control Protocol Menu. |
| `vlan <1-4095>` | Displays the VLAN Configuration Menu. |
| `upfast enable\|disable` | Enables or disables Fast Uplink Convergence, which provides rapid Spanning Tree convergence to an upstream switch during failover.<br>**Note**: When enabled, this feature increases bridge priorities to 65500 for all STGs and path cost by 3000 for all external STP ports. |
| `update <10-200>` | Configures the station update rate, in packets per second.<br>The range is 10-200. The default value is 40. |
| `cur` | Displays current Layer 2 parameters. |

# Rapid Spanning Tree Protocol / Multiple Spanning Tree Protocol configuration

Command: `/cfg/l2/mrst`

```
[Multiple Spanning Tree Menu]
      cist    - Common and Internal Spanning Tree menu
      name    - Set MST region name
      rev     - Set revision level of this MST region
      maxhop  - Set Maximum Hop Count for MST (4 - 60)
      mode    - Spanning Tree Mode
      on      - Globally turns RSTP/MSTP ON
      off     - Globally turns RSTP/MSTP OFF
      cur     - Display current MST parameters
```

The switch supports the IEEE 802.1w Rapid Spanning Tree Protocol (RSTP) and IEEE 802.1s Multiple Spanning Tree Protocol (MSTP). MSTP allows you to map many VLANs to a small number of spanning tree groups, each with its own topology.

You can configure up to 31 spanning tree groups on the switch (STG 32 is reserved for switch management). MRST is turned off by default.

NOTE: When Multiple Spanning Tree is turned on, VLAN 1 is moved from Spanning Tree Group 1 to the Common Internal Spanning Tree (CIST). When Multiple Spanning Tree is turned off, VLAN 1 is moved back to Spanning Tree Group 1.

The following table describes the Multiple Spanning Tree Configuration Menu options.

Table 86 Multiple Spanning Tree Configuration Menu options

| Command | Description |
|---|---|
| `cist` | Displays the Common Internal Spanning Tree (CIST) Menu. |
| `name <1-32 characters>` | Configures a name for the MSTP region. All devices within a MSTP region must have the same region name. |
| `rev <0-65535>` | Configures the revision level for the MSTP region. The revision level is used as a numerical identifier for the region. All devices within a MSTP region must have the same revision level number. The range is 0-65535. |
| `maxhop <4-60>` | Configures the maximum number of bridge hops a packet may to traverse before it is dropped. The range is from 4 to 60 hops. The default is 20. |
| `mode rstp\|mstp` | Selects either Rapid Spanning Tree mode (`rstp`) or Multiple Spanning Tree mode (`mstp`). The default mode is RSTP. |
| `on` | Globally turn RSTP/MSTP ON.<br>Note: When RSTP is turned on, the configuration parameters for STP group 1 apply to RSTP |
| `off` | Globally turn RSTP/MSTP OFF. This is the default. |
| `cur` | Displays the current RSTP/MSTP configuration. |

NOTE:

- IEEE 802.1w standard-based RSTP implementation runs on one STG (i.e. same as one spanning tree instance) only. As a result, if 'rstp' mode is selected under the `/cfg/mrst/mode` command, then only a single RSTP instance (default for STG 1) is supported for all VLANs, including the Default VLAN 1.
- If multiple spanning tree instances are required, then select 'mstp' mode so that multiple VLANs are handled by multiple spanning tree instances, as specified by IEEE 802.1s standard-based MSTP implementation.
- IEEE 802.1s MSTP supports rapid convergence using IEEE 802.1w RSTP.
- PVST+ does not support rapid convergence in current versions.

NOTE:

The following configurations are unsupported:

- PVST+ (default Spanning Tree setting) is NOT interoperable with Cisco Rapid PVST+.
- MSTP/RSTP (with mode set to either 'mstp' or 'rstp') is NOT interoperable with Cisco Rapid PVST+.

The following configurations are supported:

- PVST+ (default Spanning Tree setting) is interoperable with Cisco PVST+.
- MSTP/RSTP (with mode set to 'mstp') is interoperable with Cisco MST/RSTP.

# Common Internal Spanning Tree configuration

Command: `/cfg/l2/mrst/cist`

```
[Common Internal Spanning Tree Menu]
    brg     - CIST Bridge parameter menu
    port    - CIST Port parameter menu
    add     - Add VLAN(s) to CIST
    default - Default Common Internal Spanning Tree and Member parameters
    cur     - Display current CIST parameters
```

The Common Internal Spanning Tree (CIST) provides compatibility with different MSTP regions and with devices running different Spanning Tree instances. It is equivalent to Spanning Tree Group 0.

The following table describes the commands used to configure Common Internal Spanning Tree Configuration Menu options.

Table 87 Common Internal Spanning Tree Configuration Menu options

| Command | Description |
|---|---|
| `Brg` | Displays the CIST Bridge Menu. |
| `port <port number>` | Displays the CIST Port Menu. |
| `Add <1-4095>` | Adds VLANs to the CIST. Enter one VLAN per line, and press Enter to add the VLANs. |
| `default` | Resets all CIST parameters to their default values. |
| `Cur` | Displays the current CIST configuration. |

# CIST bridge configuration

Command: `/cfg/l2/mrst/cist/brg`

```
[CIST Bridge Menu]
      prior   - Set CIST bridge Priority (0-65535)
      mxage   - Set CIST bridge Max Age (6-40 secs)
      fwd     - Set CIST bridge Forward Delay (4-30 secs)
      cur     - Display current CIST bridge parameters
```

CIST bridge parameters are used only when the switch is in MSTP mode. CIST parameters do not affect operation of STP/PVST+.

The following table describes the commands used to configure CIST Bridge Configuration Menu options parameters.

Table 88 CIST Bridge Configuration Menu options

| Command | Description |
|---|---|
| `prior <0-65535>` | Configures the CIST bridge priority. The bridge priority parameter controls which bridge on the network is the MSTP root bridge.<br>To make this switch the root bridge, configure the bridge priority lower than all other switches and bridges on your network. The lower the value, the higher the bridge priority. The range is 0 to 65535, and the default is 32768.<br>This command does not apply to RSTP. See the "Bridge Spanning Tree configuration" section for more information. |
| `mxage <6-40>` | Configures the CIST bridge maximum age. The maximum age parameter specifies the maximum time the bridge waits without receiving a configuration bridge protocol data unit before it reconfigures the MSTP network. The range is 6 to 40 seconds, and the default is 20 seconds.<br>This command does not apply to RSTP. See the "Bridge Spanning Tree configuration" section for more information. |
| `fwd <4-30>` | Configures the CIST bridge forward delay parameter. The forward delay parameter specifies the amount of time that a bridge port has to wait before it changes from the listening state to the learning state and from the learning state to the forwarding state. The range is 4 to 30 seconds, and the default is 15 seconds.<br>This command does not apply to RSTP. See the "Bridge Spanning Tree configuration" section for more information. |
| `cur` | Displays the current CIST bridge configuration. |

# CIST port configuration

Command: `/cfg/l2/mrst/cist/port <port number>`

```
[CIST Port 1 Menu]
   prior   - Set port Priority (0-240)
   cost    - Set port Path Cost (1-200000000, 0 for auto)
   hello   - Set CIST port Hello Time (1-10 secs)
   link    - Set MSTP link type (auto, p2p, or shared; default: auto)
   edge    - Enables or disables edge port
   on      - Turn port's Spanning Tree ON
   off     - Turn port's Spanning Tree OFF
   cur     - Display current port Spanning Tree parameters
```

CIST port parameters are used to modify MST operation on an individual port basis. CIST parameters do not affect operation of STP/PVST+.

Port parameters include:

- Port priority
- Port path cost
- Port Hello time
- Link type
- Edge
- On and off
- Current port configuration

The following table describes the commands used to configure CIST Port Configuration Menu options.

Table 89 CIST Port Configuration Menu options

| Command | Description |
|---|---|
| `prior <0-240>` | Configures the CIST port priority. The port priority helps determine which bridge port becomes the designated port. In a network topology that has multiple bridge ports connected to a single segment, the port with the lowest port priority becomes the designated port for the segment. The range is 0 to 240, in steps of 16 (0, 16, 32...), and the default is 128. |
| `cost <1-200000000>` | Configures the CIST port path cost. The port path cost is used to help determine the designated port for a segment. Generally speaking, the faster the port, the lower the path cost. The default is 20000 for Gigabit ports. |
| `hello <1-10>` | Configures the CIST port Hello time. The Hello time specifies how often the root bridge transmits a configuration bridge protocol data unit (BPDU). Any bridge that is not the root bridge uses the root bridge Hello value. The range is 1 to 10 seconds, and the default is 2 seconds. |
| `link auto\|p2p\|shared` | Defines the type of link connected to the port, as follows:<br>auto: Configures the port to detect the link type, and automatically match its settings.<br>p2p: Configures the port for Point-To-Point protocol.<br>shared: Configures the port to connect to a shared medium (usually a hub).<br>The default link type is auto. |
| `edge disable\|enable` | Enables or disables this port as an edge port. An edge port is not connected to a bridge, and can begin forwarding traffic as soon as the link is up. Configure server ports as edge ports (enabled). By default, Ports 1-16 are configured as edge ports. |
| `On` | Enables CIST on the port. This is the default for Ports 17-18 and 20-24. |
| `Off` | Disables CIST on the port. |
| `Cur` | Displays the current CIST port configuration. |

# Spanning Tree configuration

Command: `/cfg/l2/stp <STG number>`

```
[Spanning Tree Group 1 Menu]
      brg     - Bridge parameter menu
      port    - Port parameter menu
      add     - Add VLAN(s) to Spanning Tree Group
      remove  - Remove VLAN(s) from Spanning Tree Group
      clear   - Remove all VLANs from Spanning Tree Group
      on      - Globally turn Spanning Tree ON
      off     - Globally turn Spanning Tree OFF
      default - Default Spanning Tree and Member parameters
      cur     - Display current bridge parameters
```

This switch supports the IEEE 802.1D Spanning Tree Protocol (STP) and Cisco PVST+ protocols. You can configure up to 31 spanning tree groups on the switch (STG 32 is reserved for switch management). Spanning Tree is turned on by default.

NOTE: When RSTP is turned on, only STP group 1 can be configured.

The following table describes the Spanning Tree Configuration Menu options.

Table 90 Spanning Tree Configuration Menu options

| Command | Description |
|---|---|
| `brg` | Displays the Bridge Spanning Tree Menu. |
| `port <port number>` | Displays the Spanning Tree Port Menu. |
| `add <1-4094>` | Associates a VLAN with a spanning tree and requires an external VLAN ID as a parameter. |
| `remove <1-4094>` | Breaks the association between a VLAN and a spanning tree and requires an external VLAN ID as a parameter. |
| `clear` | Removes all VLANs from a spanning tree. |
| `on` | Globally enables Spanning Tree Protocol. |
| `off` | Globally disables Spanning Tree Protocol. |
| `default` | Restores a spanning tree instance to its default configuration. |
| `cur` | Displays current Spanning Tree Protocol parameters. |

# Bridge Spanning Tree configuration

Command: `/cfg/l2/stp <STG number>/brg`

```
[Bridge Spanning Tree Menu]
      prior   - Set bridge Priority [0-65535]
      hello   - Set bridge Hello Time [1-10 secs]
      mxage   - Set bridge Max Age (6-40 secs)
      fwd     - Set bridge Forward Delay (4-30 secs)
      cur     - Display current bridge parameters
```

Spanning tree bridge parameters can be configured for each Spanning Tree Group. STP bridge parameters include:

- Bridge priority
- Bridge hello time
- Bridge maximum age
- Forwarding delay
- Current bridge configuration

The following table describes the Bridge Spanning Tree Configuration Menu options.

Table 91 Bridge Spanning Tree Configuration Menu options

| Command | Description |
|---|---|
| `prior <0-65535>` | Configures the bridge priority. The bridge priority parameter controls which bridge on the network is the STP root bridge.<br>To make this switch the root bridge, configure the bridge priority lower than all other switches and bridges on your network. The lower the value, the higher the bridge priority. The range is 0 to 65535, and the default is 32768.<br>RSTP/MSTP: The range is 0 to 61440, in steps of 4096 (0, 4096, 8192...), and the default is 32768.<br>This command does not apply to MSTP. See the “Common Internal Spanning Tree configuration” section for more information. |
| `hello <1-10>` | Configures the bridge hello time. The hello time specifies how often the root bridge transmits a configuration bridge protocol data unit (BPDU).<br>Any bridge that is not the root bridge uses the root bridge hello value. The range is 1 to 10 seconds, and the default is 2 seconds.<br>This command does not apply to MSTP. See the “Common Internal Spanning Tree configuration” section for more information. |
| `mxage <6-40>` | Configures the bridge maximum age. The maximum age parameter specifies the maximum time the bridge waits without receiving a configuration bridge protocol data unit before it reconfigures the STP network. The range is 6 to 40 seconds, and the default is 20 seconds.<br>This command does not apply to MSTP. See the “Common Internal Spanning Tree configuration” section for more information. |

Table 91 Bridge Spanning Tree Configuration Menu options

| Command | Description |
|---|---|
| `fwd <4-30>` | Configures the bridge forward delay parameter. The forward delay parameter specifies the amount of time that a bridge port has to wait before it changes from the listening state to the learning state and from the learning state to the forwarding state. The range is 4 to 30 seconds, and the default is 15 seconds.<br>This command does not apply to MSTP. See the "Common Internal Spanning Tree configuration" section for more information. |
| `cur` | Displays the current bridge STP parameters. |

When configuring STP bridge parameters, the following formulas must be used:

- 2*(*fwd*-1) ≥ *mxage*
- 2*(*hello*+1) ≤ *mxage*

# Spanning Tree port configuration

Command: `/cfg/l2/stp <STG number>/port <port number>`

```
[Spanning Tree Port 1 Menu]
      prior   - Set port Priority (0-255)
      cost    - Set port Path Cost (1-65535 (802.1d) /
                1-200000000 (MSTP/RSTP)/0 for auto)
      link    - Set port link type (auto, p2p, or shared; default: auto)
      edge    - Enables or disables this port as an edge port
      fastfwd - Enable/disable Port Fast Forwarding mode
      on      - Turn port's Spanning Tree ON
      off     - Turn port's Spanning Tree OFF
      cur     - Display current port Spanning Tree parameters
```

By default for STP/PVST+, Spanning tree is turned Off for downlink ports (1-16), and turned On for cross-connect ports (17-18), and uplink ports (20-24). By default for RSTP/MSTP, Spanning tree is turned Off for all downlink ports (1-16) configured as Edge ports, and turned On for cross-connect ports (17-18), and all uplink ports (20-24).

Spanning tree port parameters are used to modify STP operation on an individual port basis. STP port parameters include:

- Port priority
- Port path cost

The following table describes the Spanning Tree Port Configuration Menu options.

Table 92 Spanning Tree Port Configuration Menu options

| Command | Description |
|---|---|
| `prior <0-255>` | Configures the port priority. The port priority helps determine which bridge port becomes the designated port.<br>In a network topology that has multiple bridge ports connected to a single segment, the port with the lowest port priority becomes the designated port for the segment.<br>The range is 0 to 255, and the default is 128.<br>RSTP/MSTP: The range is 0 to 240, in steps of 16 (0, 16, 32...) and the default is 128. |
| `cost <0-200000000>` | Configures the port path cost. The port path cost is used to help determine the designated port for a segment. Generally speaking, the faster the port, the lower the path cost.<br>The range is 0 to 65535. The default is 4 for Gigabit ports except Port 19. A value of 0 indicates that the default cost will be computed for an auto-negotiated link speed. The default cost is 19 for 100Mb/s ports and 4 for Gigabit ports.<br>RSTP/MSTP: The range is 0 – 200000000, and the default is 20000 for Gigabit ports except Port 19. |
| `link auto\|p2p\|shared` | Defines the type of link connected to the port, as follows:<br>• auto: Configures the port to detect the link type, and automatically match its settings.<br>• p2p: Configures the port for Point-To-Point protocol.<br>• shared: Configures the port to connect to a shared medium (usually a hub).<br>This command only applies when RSTP is turned on. See the "Common Internal Spanning Tree configuration" section for more information. |

Table 92 Spanning Tree Port Configuration Menu options

| Command | Description |
|---|---|
| `edge disable\|enable` | Enables or disables this port as an edge port. An edge port is not connected to a bridge, and can begin forwarding traffic as soon as the link is up. Configure server ports as edge ports (enabled). By default, Ports 1-16 are configured as edge ports.<br>This command only applies when RSTP is turned on. See the "Common Internal Spanning Tree configuration" section for more information. |
| `fastfwd disable\|enable` | Enables or disables Port Fast Forward on the port. The default is disabled. |
| `on` | Enables STP on the port. This is the default for Ports 17-18 and 20-24. |
| `off` | Disables STP on the port. |
| `cur` | Displays the current STP port parameters. |

# Forwarding Database configuration

Command: `/cfg/l2/fdb`

```
[FDB Menu]
     static   - Static FDB Menu
     aging    - Configure FDB aging value
     cur      - Display current FDB configuration
```

The following table describes the Forwarding Database Configuration Menu options.

Table 93 FDB Configuration Menu options

| Command | Description |
|---|---|
| `static` | Displays the Static FDB Configuration Menu. |
| `aging <0-65535>` | Configures the aging value for FDB entries. The default value is 300. |
| `cur` | Displays current FDB parameters. |

## Static FDB configuration

Command: `/cfg/l2/fdb/static`

```
[Static FDB Menu]
     add      - Add a permanent FDB entry
     del      - Delete a static FDB entry
     clear    - Clear static FDB entries
     cur      - Display current static FDB configuration
```

The following table describes the Static FDB Configuration Menu options.

Table 94 Static FDB Configuration Menu options

| Command | Description |
|---|---|
| `add <MAC address> <VLAN> <port>` | Adds a static entry to the forwarding database. |
| `del <MAC address> <VLAN> <port>` | Deletes a static entry from the forwarding database. |
| `clear mac <MAC Address>\|VLAN <1-4095>\|`<br>`Port <port number>\|All` | Clears specified static FDB entries from the forwarding database,<br>as follows:<br>• MAC address<br>• VLAN<br>• Port<br>• All |
| `cur` | Displays current static FDB parameters. |

# Trunk configuration

Command: `/cfg/l2/trunk <1-12>`

```
[Trunk group 1 Menu]
      add     - Add port to trunk group
      rem     - Remove port from trunk group
      ena     - Enable trunk group
      dis     - Disable trunk group
      del     - Delete trunk group
      cur     - Display current Trunk Group configuration
```

Trunk groups can provide super-bandwidth connections between switches or other trunk capable devices. A trunk is a group of ports that act together, combining their bandwidth to create a single, larger port. Up to 12 trunk groups can be configured on the switch, with the following restrictions.

- Any physical switch port can belong to no more than one trunk group.
- Up to six ports/trunks can belong to the same trunk group.
- All ports in a trunk must have the same configuration for speed, flow control, and auto negotiation.
- Trunking from other devices must comply with Cisco® EtherChannel® technology.
- By default, port 17 and port 18 are trunked to support an internal switch-to-switch crosslink trunk. By default, ports 17 and 18 are disabled.

NOTE: See the *Application Guide* for information on how to use port trunks.

The following table describes the Trunk Group Configuration Menu options.

Table 95 Trunk Group Configuration Menu options

| Command | Description |
|---|---|
| `add <port number>` | Adds a physical port to the current trunk group. |
| `rem <port number>` | Removes a physical port from the current trunk group. |
| `ena` | Enables the current trunk group. |
| `dis` | Turns the current trunk group off. |
| `del` | Removes the current trunk group configuration. |
| `cur` | Displays current trunk group parameters. |

# IP Trunk Hash configuration

Command: `/cfg/l2/thash`

```
[IP Trunk Hash Menu]
     set      - IP Trunk Hash Settings Menu
     cur      - Display current IP trunk hash configuration
```

The following table describes the IP Trunk Hash Configuration Menu options.

Table 96 IP Trunk Hash Configuration Menu options

| Command | Description |
|---|---|
| `set` | Displays the Trunk Hash Settings menu. |
| `cur` | Display current trunk hash configuration. |

## Layer 2 IP Trunk Hash configuration

Command: `/cfg/l2/thash/set`

```
[set IP Trunk Hash Settings Menu]
     smac     - Enable/disable smac hash
     dmac     - Enable/disable dmac hash
     sip      - Enable/disable sip hash
     dip      - Enable/disable dip hash
     cur      - Display current trunk hash setting
```

Trunk hash parameters are set globally for the switch. You can enable one or two parameters, to configure any of the following valid combinations:

- SMAC (source MAC only)
- DMAC (destination MAC only)
- SIP (source IP only)

- DIP (destination IP only)
- SIP + DIP (source IP and destination IP)
- SMAC + DMAC (source MAC and destination MAC)

The following table describes the IP Trunk Hash Configuration Menu options.

Table 97 IP Trunk Hash Set Menu options

| Command | Description |
|---|---|
| `smac enable\|disable` | Enable or disable trunk hashing on the source MAC. |
| `dmac enable\|disable` | Enable or disable trunk hashing on the destination MAC. |
| `sip enable\|disable` | Enable or disable trunk hashing on the source IP. |
| `dip enable\|disable` | Enable or disable trunk hashing on the destination IP. |
| `cur` | Display current trunk hash configuration. |

# Link Aggregation Control Protocol configuration

Command: `/cfg/l2/lacp`

```
[LACP Menu]
     sysprio  - Set LACP system priority
     timeout  - Set LACP system timeout scale for timing out partner info
     port     - LACP port Menu
     cur      - Display current LACP configuration
```

The following table describes the LACP Configuration Menu options.

Table 98 LACP Configuration Menu options

| Command | Description |
|---|---|
| `sysprio <1-65535>` | Defines the priority value (1 through 65535) for the switch. Lower numbers provide higher priority. The default value is 32768. |
| `timeout short\|long` | Defines the timeout period before invalidating LACP data from a remote partner. Choose **`short`** (3 seconds) or **`long`** (90 seconds). The default value is **`long`**.<br>**Note**: We recommends that you use a timeout value of **`long`**, to reduce LACPDU processing. If your switch's CPU utilization rate remains at 100% for periods of 90 seconds or more, consider using static trunks instead of LACP. |
| `port <port number>` | Displays the LACP Port menu. |
| `cur` | Display current LACP configuration. |

## LACP Port configuration

Command: `/cfg/l2/lacp/port <port number>`

```
[LACP Port 2 Menu]
     mode     - Set LACP mode
     prio     - Set LACP port priority
     adminkey - Set LACP port admin key
     cur      - Display current LACP port configuration
```

The following table describes the LACP Port Configuration Menu options.

Table 99 LACP Port Configuration Menu options

| Command | Description |
|---|---|
| `mode off\|active\|passive` | Set the LACP mode for this port, as follows:<br>• **off**<br>Turn LACP off for this port. You can use this port to manually configure a static trunk. The default value is **`off`**.<br>• **active**<br>Turn LACP on and set this port to active. Active ports initiate LACPDUs.<br>• **passive**<br>Turn LACP on and set this port to passive. Passive ports do not initiate LACPDUs, but respond to LACPDUs from active ports. |
| `prio <1-65535>` | Sets the priority value for the selected port. Lower numbers provide higher priority. Default is 32768. |

Table 99 LACP Port Configuration Menu options

| Command | Description |
|---|---|
| `adminkey <1-65535>` | Set the admin key for this port. Only ports with the same admin key and oper key (operational state generated internally) can form a LACP trunk group. |
| `cur` | Displays the current LACP configuration for this port. |

# VLAN configuration

Command: `/cfg/l2/vlan <1-4095>`

```
[VLAN 1 Menu]
      name    - Set VLAN name
      stg     - Assign VLAN to a Spanning Tree Group
      add     - Add port to VLAN
      rem     - Remove port from VLAN
      def     - Define VLAN as list of ports
      ena     - Enable VLAN
      dis     - Disable VLAN
      del     - Delete VLAN
      cur     - Display current VLAN configuration
```

The commands in this menu configure VLAN attributes, change the status of the VLAN, delete the VLAN, and change the port membership of the VLAN.

By default, the VLAN menu option is disabled except VLAN 1, which is always enabled. This switch supports a maximum of 1,000 VLANs. VLAN 4095 is reserved for switch management.

NOTE: See the *Application Guide* for information on VLANs.

The following table describes the VLAN Configuration Menu options.

Table 100 VLAN Configuration Menu options

| Command | Description |
|---|---|
| `name <1-32 characters>` | Assigns a name to the VLAN or changes the existing name. The default VLAN name is the first one. |
| `stg <0-32>` | Assigns a VLAN to a spanning tree group. STG number is assigned STGs 1-32 for STP/PVST+, only STG 1 for RSTP, and STGs 0-32 for MSTP (STG 0 is CIST). |
| `add <port number>` | Adds ports to the VLAN membership. |
| `rem <port number>` | Removes ports from the VLAN membership. |
| `def <list of port numbers>` | Defines which ports are members of this VLAN. Every port must be a member of at least one VLAN. By default, it defines ports to VLAN 1. |
| `ena` | Enables this VLAN. |
| `dis` | Disables this VLAN without removing it from the configuration. |
| `del` | Deletes this VLAN. |
| `cur` | Displays the current VLAN configuration. |

IMPORTANT: All ports must belong to at least one VLAN. Any port which is removed from a VLAN and which is not a member of any other VLAN is automatically added to default VLAN #1. You cannot remove a port from VLAN #1 if the port has no membership in any other VLAN. Also, you cannot add a port to more than one VLAN unless the port has VLAN tagging turned on. See the tag command, in the “Port configuration” section earlier in this chapter.

# Layer 3 configuration

Command: `/cfg/l3`

```
[Layer 3 Menu]
     if       - Interface Menu
     gw       - Default Gateway Menu
     arp      - ARP Menu
     igmp     - IGMP Menu
     dns      - Domain Name System Menu
     cur      - Display current IP configuration
```

The following table describes the Layer 3 Configuration Menu options. Layer 3 functionality is limited in this release.

Table 101 L3 Configuration Menu options

| Command | Description |
|---|---|
| `if <1-256>` | Displays the IP Interface Menu. |
| `gw <1-4>` | Displays the IP Default Gateway Menu. |
| `arp` | Displays the ARP (Address Resolution Protocol) Menu. |
| `igmp` | Displays the IGMP Menu. |
| `dns` | Displays the IP Domain Name System Menu. |
| `cur` | Displays the current IP configuration. |

# IP interface configuration

Command: `/cfg/l3/if <1-256>`

```
[IP Interface 1 Menu]
     addr     - Set IP address
     mask     - Set subnet mask
     vlan     - Set VLAN number
     ena      - Enable IP interface
     dis      - Disable IP interface
     del      - Delete IP interface
     cur      - Display current interface configuration
```

The switch can be configured with up to 256 IP interfaces. Each IP interface represents the switch on an IP subnet on your network. The IP Interface option is disabled by default. Interface 256 is reserved for switch management.

The following table describes the IP Interface Configuration Menu options.

Table 102 IP Interface Configuration Menu options

| Command | Description |
|---|---|
| `addr <IP address>` | Configures the IP address of the switch interface, using dotted decimal notation. For example, 192.2.14.101 |
| `mask <IP subnet mask>` | Configures the IP subnet address mask for the interface using dotted decimal notation. For example, 255.255.255.0 |
| `vlan <1-4094>` | Configures the VLAN number for this interface. Each interface can belong to one VLAN, though any VLAN can have multiple IP interfaces in it. |
| `ena` | Enables this IP interface. |
| `dis` | Disables this IP interface. |
| `del` | Removes this IP interface. |
| `cur` | Displays the current interface settings. |

NOTE: If you enter an IP address for interface 1, you are prompted to change the BOOTP setting. Interface 256 is reserved for switch management interface.

## Default Gateway configuration

Command: `/cfg/l3/gw <1-4>`

```
[Default gateway 1 Menu]
      addr    - Set IP address
      intr    - Set interval between ping attempts
      retry   - Set number of failed attempts to declare gateway DOWN
      arp     - Enable/disable ARP only health checks
      ena     - Enable default gateway
      dis     - Disable default gateway
      del     - Delete default gateway
      cur     - Display current default gateway configuration
```

The switch supports up to four gateways. By default, no gateways are configured on the switch. Enter 1, 2, 3, or 4 in the command as the <*gateway number*>, depending upon which gateway you want to configure. Gateway 4 is reserved for switch management.

The following table describes the Default IP Gateway Configuration Menu options.

Table 103 Default IP Gateway Configuration Menu options

| Command | Description |
|---|---|
| `addr <IP address>` | Configures the IP address of the default IP gateway using dotted decimal notation. For example, 192.4.17.44 |
| `intr <0-60>` | The switch pings the default gateway to verify that it is up. The intr option sets the time between health checks. The range is from 0 to 60 seconds. The default is 2 seconds. |
| `retry <1-120>` | Sets the number of failed health check attempts required before declaring this default gateway inoperative. The range is from 1 to 120 attempts. The default is 8 attempts. |
| `arp disable\|enable` | Enables or disables Address Resolution Protocol (ARP) health checks. This command is disabled by default. |
| `ena` | Enables the gateway for use. |
| `dis` | Disables the gateway. |
| `del` | Deletes the gateway from the configuration. |
| `cur` | Displays the current gateway settings. |

NOTE: Gateway 4 is reserved for switch management interface.

# Address Resolution Protocol configuration

Command: `/cfg/l3/arp`

```
[ARP Menu]
     rearp    - Set re-ARP period in minutes
     cur      - Display current ARP configuration
```

Address Resolution Protocol (ARP) is the TCP/IP protocol that resides within the Internet layer. ARP resolves a physical address from an IP address. ARP queries machines on the local network for their physical addresses. ARP also maintains IP to physical address pairs in its cache memory. In any IP communication, the ARP cache is consulted to see if the IP address of the computer or the router is present in the ARP cache. Then the corresponding physical address is used to send a packet.

The following table describes the ARP Configuration Menu options.

Table 104 ARP Configuration Menu options

| Command | Description |
|---|---|
| `rearp <2-120>` | Defines re-ARP period in minutes. You can set this duration between two and 120 minutes. The default value is 10 minutes. |
| `cur` | Displays the current ARP configurations. |

# IGMP configuration

Command: `/cfg/l3/igmp`

```
[IGMP Menu]
     snoop    - IGMP Snoop Menu
     mrouter  - Static Multicast Router Menu
     igmpflt  - IGMP Filtering Menu
     on       - Globally turn IGMP ON
     off      - Globally turn IGMP OFF
     cur      - Display current IGMP configuration
```

IGMP Snooping allows the switch to forward multicast traffic only to those ports that request it. IGMP Snooping prevents multicast traffic from being flooded to all ports. The switch learns which server hosts are interested in receiving multicast traffic, and forwards it only to ports connected to those servers.

The following table describes the IGMP Menu options.

Table 105 IGMP Snoop Menu options

| Command | Description |
|---|---|
| `snoop` | Displays the IGMP Snoop Menu. |
| `mrouter` | Displays the Static Multicast Router Menu. |
| `igmpflt` | Displays the IGMP Filtering Menu. |
| `on` | Globally turns IGMP on. |
| `off` | Globally turns IGMP off. This is the default. |
| `cur` | Displays the current IGMP configuration parameters. |

# IGMP snooping configuration

Command: `/cfg/l3/igmp/snoop`

```
[IGMP Snoop Menu]
     timeout  - Set report timeout
     mrto     - Set multicast router timeout
     qintrval - Set IGMP query interval
     robust   - Set expected packet loss on subnet
     aggr     - Aggregate IGMP report
     srcip    - Set source ip to use when proxying GSQ
     add      - Add VLAN(s) to IGMP Snooping
     rem      - Remove VLAN(s) from IGMP Snooping
     clear    - Remove all VLAN(s) from IGMP Snooping
     fastlv   - Enable/disable Fastleave processing in VLAN
     cur      - Display current IGMP Snooping configuration
```

The following table describes the IGMP Snoop Configuration Menu options.

Table 106 IGMP Snoop Menu options

| Command | Description |
|---|---|
| `timeout <1-255>` | Sets the Maximum Response Time (MRT) for IGMP hosts. MRT is one of the parameters used to determine the age out period of the IGMP hosts. Increasing the timeout increases the age out period.<br>The range is from 1 to 255 seconds. The default is 10 seconds |
| `mrto <1-600>` | Configures the age-out period for the IGMP Mrouters in the Mrouter table. If the switch does not receive a General Query from the Mrouter for `mrto` seconds, the switch removes the multicast router from its Mrouter table.<br>The range is from 1 to 600 seconds. The default is 255 seconds. |
| `qintrval <1-600>` | Sets the IGMP router query interval. The range is 1-600 seconds. The default value is 125. |
| `robust <2-10>` | Configures the IGMP Robustness variable, which allows you to tune the switch for expected packet loss on the subnet. If the subnet is expected to be lossy (high rate of packet loss), then increase the value. The default value is 2. |
| `aggr disable\|enable` | Enables or disables IGMP Membership Report aggregation. The default is enabled. |
| `srcip <IP address>` | Configures the source IP address used as a proxy for IGMP Group Specific Queries. |
| `add <1-4094>` | Adds the VLAN to IGMP Snooping. |
| `rem <1-4094>` | Removes the VLAN from IGMP Snooping. |

Table 106 IGMP Snoop Menu options

| Command | Description |
|---|---|
| `clear` | Removes all VLANs from IGMP Snooping. |
| `fastlv <1-4094> disable\|enable` | Enables or disables Fastleave processing. Fastleave allows the switch to immediately remove a port from the IGMP port list, if the host sends a Leave message, and the proper conditions are met. This command is disabled by default. |
| `ena` | Enables IGMP Snooping. |
| `dis` | Disables IGMP Snooping. This is the default. |
| `cur` | Displays the current IGMP Snooping parameters. |

# IGMP static multicast router configuration

Command: `/cfg/l3/igmp/mrouter`

```
[Static Multicast Router Menu]
    add - Add port as Multicast Router Port
    rem - Remove port as Multicast Router Port
    cur - Display current Multicast Router configuration
```

The following table describes the Static Multicast Router Configuration Menu options.

NOTE: When you configure a static multicast router on a VLAN, the process of learning multicast routers is disabled for that VLAN.

Table 107 IGMP Static Multicast Router Menu

| Command | Description |
|---|---|
| `add <port number> <1-4094> <1-2>` | Selects a port/VLAN combination on which the static multicast router is connected, and configures the IGMP version (1 or 2) of the multicast router.<br>**Note**: Port number must be an external port (20-24). |
| `remove <port number> <1-4094> <1-2>` | Removes a static multicast router from the selected port/VLAN combination. |
| `cur` | Displays the current IGMP Static Multicast Router parameters. |

## IGMP filtering configuration

Command: `/cfg/l3/igmp/igmpflt`

```
[IGMP Filter Menu]
   filter - IGMP Filter Definition Menu
   port   - IGMP Filtering Port Menu
   ena    - Enable IGMP Filtering
   dis    - Disable IGMP Filtering
   cur    - Display current IGMP Filtering configuration
```

The following table describes the IGMP Filter Configuration Menu options.

Table 108 IGMP Filtering Menu

| Command | Description |
|---|---|
| `filter <1-16>` | Displays the IGMP Filter Definition Menu. |
| `port <port number>` | Displays the IGMP Filtering Port Menu. |
| `ena` | Enables IGMP filtering globally. |
| `dis` | Disables IGMP Filtering globally. This is the default. |
| `cur` | Displays the current IGMP Filtering parameters. |

## IGMP filter definition

Command: `/cfg/l3/igmp/igmpflt/filter`

```
[IGMP Filter 1 Definition Menu]
   range  - Set IP Multicast address range
   action - Set filter action
   ena    - Enable filter
   dis    - Disable filter
   del    - Delete filter
   cur    - Display current IGMP filter configuration
```

The following table describes the IGMP Filter Definition Menu options.

Table 109 IGMP Filter Definition Menu

| Command | Description |
|---|---|
| `range <IP multicast address> <IP multicast address>` | Configures the range of IP multicast addresses for this filter. Enter the first IP multicast address of the ranger, followed by the second IP multicast address of the range. |
| `action allow\|deny` | Allows or denies multicast traffic for the IP multicast addresses specified. |
| `ena` | Enables this IGMP filter. |
| `dis` | Disables this IGMP filter. This is the default. |
| `del` | Deletes this filter's parameter definitions. |
| `cur` | Displays the current IGMP filter. |

## IGMP filtering port configuration

Command: `/cfg/l3/igmp/igmpflt/port`

```
[IGMP Port 17 Menu]
   filt - Enable/disable IGMP Filtering on port
   add  - Add IGMP filter to port
   rem  - Remove IGMP filter from port
   cur  - Display current IGMP Filtering Port configuration
```

The following table describes the IGMP Port Filtering Configuration Menu options.

Table 110 IGMP Filtering Port Menu

| Command | Description |
|---|---|
| `filt enable\|disable` | Enables or disables IGMP Filtering on this port. The default is disabled. |
| `add <1-16>` | Adds an IGMP filter to this port. |
| `rem <1-16>` | Removes an IGMP filter from this port. |
| `cur` | Displays the current IGMP filter parameters for this port. |

# Domain Name System configuration

Command: `/cfg/l3/dns`

```
[Domain Name System Menu]
      prima   - Set primary DNS server address
      secon   - Set secondary DNS server address
      dname   - Set default domain name
      cur     - Display current DNS configuration
```

The Domain Name System (DNS) Configuration Menu is used for defining the primary and secondary DNS servers on your local network, and for setting the default domain name served by the switch services. DNS parameters must be configured prior to using hostname parameters with the ping, traceroute, and tftp commands.

The following table describes the Domain Name System (DNS) Configuration Menu options.

Table 111 Domain Name System (DNS) Configuration Menu options

| Command | Description |
|---|---|
| `prima <IP address>` | Sets the IP address for your primary DNS server. Use dotted decimal notation. For example, 192.4.17.41 |
| `secon <IP address>` | Sets the IP address for your secondary DNS server. If the primary DNS server fails, the configured secondary will be used instead. Enter the IP address using dotted decimal notation. For example, 192.4.17.42 |
| `dname <dotted DNS notation>\|none` | Sets the default domain name used by the switch. For example: `mycompany.com` |
| `cur` | Displays the current Domain Name System (DNS) settings. |

# Remote Monitoring configuration

Command: `/cfg/rmon`

```
[RMON Menu]
      hist    - RMON History Menu
      event   - RMON Event Menu
      alarm   - RMON Alarm Menu
      cur     - Display current RMON configuration
```

Remote Monitoring (RMON) allows you to monitor traffic flowing through the switch. The RMON MIB is described in RFC 1757.

The following table describes the RMON Configuration Menu options.

Table 112 RMON Menu options

| Command | Description |
|---|---|
| `hist` | Displays the RMON History Menu. |
| `event` | Displays the RMON Event Menu. |
| `alarm` | Displays the RMON Alarm Menu. |
| `cur` | Displays the current RMON configuration. |

# RMON history configuration

Command: `/cfg/rmon/hist <1-65535>`

```
[RMON History 1 Menu]
      ifoid   - Set interface MIB object to monitor
      rbnum   - Set the number of requested buckets
      intrval - Set polling interval
      owner   - Set owner for the RMON group of statistics
      delete  - Delete this history and restore defaults
      cur     - Display current history configuration
```

The switch supports up to five History Groups.

The following table describes the RMON History Menu options.

Table 113 RMON History Menu options

| Command | Description |
|---|---|
| `ifoid <1-127 characters>` | Configures the interface MIB Object Identifier. The IFOID must correspond to the standard interface OID, as follows: 1.3.6.1.2.1.2.2.1.1.x<br>The interface OID can have a maximum of 127 characters. |
| `rbnum <1-65535>` | Configures the requested number of buckets, which is the number of discrete time intervals over which data is to be saved.<br>The range is from 1 to 65535. The default is 30. |
| NOTE: The maximum number of buckets that can be granted is 50. | |
| `intrval <1-3600>` | Configures the time interval over which the data is sampled for each bucket.<br>The range is from 1 to 3600 seconds. The default value is 1800 seconds. |
| `owner <1-127 characters>` | Enter a text string that identifies the person or entity that uses this history index.<br>The owner can have a maximum of 127 characters. |
| `delete` | Deletes the selected history index. |
| `cur` | Displays the current RMON History parameters. |

## RMON event configuration

Command: `/cfg/rmon/event <1-65535>`

```
[RMON Event 1 Menu]
      descn   - Set description for the event
      type    - Set event type
      owner   - Set owner for the event
      delete  - Delete this event and restore defaults
      cur     - Display current event configuration
```

The switch supports up to 30 Event Groups.

The following table describes the RMON Event Menu options.

Table 114 RMON Event Menu options

| Command | Description |
|---|---|
| `descn <1-127 characters>` | Enter a text string to describe the event.<br>The description can have a maximum of 127 characters. |
| `type none\|log\|trap\|both` | Selects the type of notification provided for this event. For log events, an entry is made in the log table and sent to the configured syslog host. For trap events, an SNMP trap is sent to the management station (`/cfg/snmp/trap`). |
| `owner <1-127 characters>` | Enter a text string that identifies the person or entity that uses this event index.<br>The owner can have a maximum of 127 characters. |
| `delete` | Deletes this event index. |
| `cur` | Displays the current RMON Event parameters. |

## RMON alarm configuration

Command: `/cfg/rmon/alarm <1-65535>`

```
[RMON Alarm 1 Menu]
      oid     - Set MIB oid datasource to monitor
      intrval - Set alarm interval
      sample  - Set sample type
      almtype - Set startup alarm type
      rlimit  - Set rising threshold
      flimit  - Set falling threshold
      revtidx - Set event index to fire on rising threshold crossing
      fevtidx - Set event index to fire on falling threshold crossing
      owner   - Set owner for the alarm
      delete  - Delete this alarm and restore defaults
      cur     - Display current alarm configuration
```

The Alarm RMON group can track rising or falling values for a MIB object. The MIB object must be a counter, gauge, integer, or time interval. Each alarm index must correspond to an event index that triggers once the alarm threshold is crossed. The switch supports up to 30 Alarm Groups.

The following table describes the RMON Alarm Menu options.

Table 115 RMON Alarm Menu options

| Command | Description |
|---|---|
| `oid <1-127 characters>` | Configures an alarm MIB Object Identifier.<br>The alarm OID can have a maximum of 127 characters. |
| `intrval <1-65535>` | Configures the time interval over which data is sampled and compared with the rising and falling thresholds.<br>The range is from 1 to 65535 seconds. The default is 1800 seconds. |
| `sample abs\|delta` | Configures the method of sampling the selected variable and calculating the value to be compared against the thresholds, as follows:<br>abs: absolute value, the value of the selected variable is compared directly with the thresholds at the end of the sampling interval.<br>delta: delta value, the value of the selected variable at the last sample is subtracted from the current value, and the difference compared with the thresholds.<br>The default is abs. |
| `almtype rising\|falling\|either` | Configures the alarm type as rising, falling, or either (rising or falling).<br>The default is either. |
| `rlimit < -2147483647 to 2147483647>` | Configures the rising threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single event is generated. The default value is 0. |
| `flimit < -2147483647 to 2147483647>` | Configures the falling threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold, a single event is generated. The default value is 0. |
| `revtidx <0-65535>` | Configures the rising alarm event index that is triggered when a rising threshold is crossed.<br>The range is from 0 to 65535. The default value is 0. |
| `fevtidx <0-65535>` | Configures the falling alarm event index that is triggered when a falling threshold is crossed.<br>The range is from 0 to 65535. The default value is 0. |
| `owner <1-127 characters>` | Enter a text string that identifies the person or entity that uses this alarm index.<br>The owner can have a maximum of 127 characters. |
| `delete` | Deletes this alarm index. |
| `cur` | Displays the current RMON Alarm parameters. |

# Port mirroring

Command: `/cfg/pmirr`

```
[Port Mirroring Menu]
      mirror  - Enable/Disable Mirroring
      monport - Monitoring Port based PM Menu
      cur     - Display All Mirrored and Monitoring Ports
```

The Port Mirroring Configuration Menu is used to configure, enable, and disable the monitored port. When enabled, network packets being sent and/or received on a target port are duplicated and sent to a monitor port. By attaching a network analyzer to the monitor port, you can collect detailed information about your network performance and usage. Port mirroring is disabled by default.

NOTE: See the “Troubleshooting tools” appendix in the *Application Guide* for information on how to use port mirroring.

The following table describes the Port Mirroring Configuration Menu options.

Table 116 Port Mirroring Configuration Menu options

| Command | Description |
|---|---|
| `mirror disable\|enable` | Enables or disables port mirroring. The default is disabled. |
| `monport <port number>` | Displays port mirroring menu. |
| `cur` | Displays current settings of the mirrored and monitoring ports. |

## Port-based port mirroring

Command: `/cfg/pmirr/monport <port number>`

```
[Port 1 Menu]
      add     - Add "Mirrored" port
      rem     - Rem "Mirrored" port
      delete  - Delete this "Monitor" port
      cur     - Display current Port-based Port Mirroring configuration
```

The following table describes the port-based Port Mirroring Configuration Menu options.

Table 117 Port Mirroring Configuration Menu options

| Command | Description |
|---|---|
| `add <mirrored port> in\|out\|both` | Adds the port to be mirrored. This command also allows you to enter the direction of the traffic. It is necessary to specify the direction because:<br>• If the source port of the frame matches the mirrored port and the mirrored direction is ingress or both (ingress and egress), the frame is sent to the mirrored port.<br>• If the destination port of the frame matches the mirrored port and the mirrored direction is egress or both, the frame is sent to the monitoring port. |
| `rem <mirrored port>` | Removes the mirrored port. |
| `delete` | Deletes this monitored port. |
| `cur` | Displays the current settings of the monitoring port. |

# Uplink Failure Detection configuration

Command: `/cfg/ufd`

```
[Uplink Failure Detection Menu]
      fdp - Failure Detection Pair Menu
      on  - Globally turn Uplink Failure Detection ON
      off - Globally turn Uplink Failure Detection OFF
      cur - Display current Uplink Failure Detection configuration
```

Uplink Failure Detection (UFD) supports network fault tolerance in network adapter teams. Use this menu to configure a Failure Detection Pair of one Links to Monitor (LtM) group and one Links to Disable (LtD) group. When UFD is enabled and a Failure Detection Pair is configured, the switch automatically disables ports in the LtD if it detects a failure in the LtM. The failure conditions which are monitored in the LtM group include port link state moving to down, or port state moving to Blocking if Spanning Tree Protocol is enabled.

The following table describes the Uplink Failure Detection (UFD) Configuration Menu options.

Table 118 Uplink Failure Detection Configuration Menu options

| Command | Description |
|---|---|
| `fdp <FDP number>` | Displays the Failure Detection Pair menu. |
| `on` | Globally turns Uplink Failure Detection ON. |
| `off` | Globally turns Uplink Failure Detection OFF. This is the default. |
| `cur` | Displays the current Uplink Failure Detection configuration parameters. |

## Failure Detection Pair configuration

Command: `/cfg/ufd/fdp <FDP number>`

```
[FDP 1 Menu]
      ltm     - Link to Monitor Menu
      ltd     - Link to Disable Menu
      ena     - Enable FDP
      dis     - Disable FDP
      current - Display current FDP configuration
```

Use these commands to configure a Failure Detection Pair, which consists of one Link to Monitor (LtM) and one Link to Disable (LtD). When the switch detects a failure on the LtM, it automatically disables the ports in the LtD.

The following table describes the Failure Detection Pair (FDP) configuration Menu options.

Table 119 Failure Detection Pair Configuration Menu options

| Command | Description |
|---|---|
| `ltm` | Displays the Links to Monitor menu. |
| `ltd` | Displays the Links to Disable menu. |
| `ena` | Enables the FDP Parameters. |
| `dis` | Disables the FDP Parameters. This is the default. |
| `current` | Displays the current FDP configuration. |

## Link to Monitor configuration

Command: `/cfg/ufd/fdp <FDP number>/ltm`

```
[Failure Link to Monitor Menu]
      addport - Add port to Link to Monitor
      remport - Remove port from Link to Monitor
      addtrnk - Add trunk to Link to Monitor
      remtrnk - Remove trunk from Link to Monitor
      addkey  - Add adminkey to Link to Monitor
      remkey  - Remove adminkey from Link to Monitor
      cur     - Display current LtM configuration
```

The following table describes the Link to Monitor (LtM) Menu options. The LtM can consist of only one uplink port (ports 20-24), a single trunk containing only uplink ports, or a single LACP trunk group containing only uplink ports.

Table 120 Link to Monitor Menu options

| Command | Description |
|---|---|
| `addport <port number>` | Adds a port to the LtM. Only uplink ports (20-24) are allowed in the LtM. |
| `remport <port number>` | Removes a port from the LtM. |
| `addtrnk <1-12>` | Adds a trunk group to the LtM. The LtM trunk group can contain only uplink ports (20-24). |
| `remtrnk <1-12>` | Removes a trunk group from the LtM. |
| `addkey <LACP port adminkey>` | Adds a LACP trunk group to the LtM. The LtM LACP trunk group can contain only uplink ports (20-24). |
| `remkey <LACP port adminkey>` | Removes a LACP trunk group from the LtM. |
| `cur` | Displays the current LtM configuration. |

## Link to Disable configuration

Command: `/cfg/ufd/fdp <FDP number>/ltd`

```
[Failure Link to Disable Menu]
      addport - Add port to Link to Disable
      remport - Remove port from Link to Disable
      addtrnk - Add trunk to Link to Disable
      remtrnk - Remove trunk from Link to Disable
      addkey  - Add adminkey to Link to Disable
      remkey  - Remove adminkey from Link to Disable
      cur     - Display current LtD configuration
```

The following table describes the Link to Disable (LtD) Menu options. The LtD can consist of any mix of downlink ports (ports 1-16) and trunk groups that contain only downlink ports and LACP trunk groups that contain only downlink ports.

Table 121 Link to Disable Menu options

| Command | Description |
|---|---|
| `addport <port number>` | Adds a port to the current LtD group. Only downlink ports (1-16) are allowed in the LtD. |
| `remport <port number>` | Removes a port from the current LtD group. |
| `addtrunk <1-12>` | Adds a trunk group to the current LtD group. LtD trunk groups can contain only downlink ports (1-16). |
| `remtrunk <1-12>` | Removes a trunk group from the current LtD group. |
| `addkey <LACP port adminkey>` | Adds a LACP trunk group to the current LtD group. LtD LACP trunk groups can contain only downlink ports (1-16). |
| `remkey <LACP port adminkey>` | Removes a LACP trunk group from the current LtD group. |
| `cur` | Displays the current LtD configuration. |

# Configuration Dump

Command: `/cfg/dump`

The dump program writes the current switch configuration to the terminal screen. To start the dump program, at the Configuration# prompt, enter:

```
Configuration# dump
```

The configuration is displayed with parameters that have been changed from the default values. The screen display can be captured, edited, and placed in a script file, which can be used to configure other switches. Paste the configuration commands from the script file at the command line prompt of the switch. The active configuration can also be saved or loaded via FTP/TFTP.

# Saving the active switch configuration

Command: `/cfg/ptcfg <TFTP server> <filename>`

When the ptcfg command is used, the active configuration commands of the switch (as displayed using `/cfg/dump`) will be uploaded to the specified script configuration file on the FTP/TFTP server. To start the switch configuration upload, at the Configuration# prompt, enter:

```
Configuration# ptcfg <FTP/TFTP server> <filename>
```

Where *<FTP/TFTP server>* is the FTP/TFTP server IP address or hostname and *<filename>* is the name of the target script configuration file.

Enter the user name, if you are using a FTP server:

```
Enter username for FTP server or hit return for TFTP server: <userID>
```

Enter the password for the FTP server (if prompted):

```
Enter password for username on FTP server: <password>
```

NOTE: The output file is formatted with line-breaks but no carriage returns. The file cannot be viewed with editors that require carriage returns (such as Microsoft Notepad).

NOTE: If the FTP/TFTP server is running SunOS™ or the Solaris™ operating system, the specified ptcfg file must exist prior to executing the ptcfg command and must be writable (set with proper permission, and not locked by any application). The contents of the specified file will be replaced with the current configuration data.

# Restoring the active switch configuration

Command: `/cfg/gtcfg <FTP/TFTP server> <filename>`

When the gtcfg command is used, the active configuration will be replaced with the commands found in the specified configuration file. The file can contain a full switch configuration or a partial configuration. The configuration loaded using gtcfg is not activated until the apply command is used. If the apply command is found in the configuration script file loaded using this command, the apply action will be performed automatically.

To start the switch configuration download, at the Configuration# prompt, enter:

```
Configuration#  gtcfg <FTP/TFTP server> <filename>
```

Where <*FTP/TFTP server*> is the FTP/TFTP server IP address or hostname and <*filename*> is the name of the target script configuration file.

Enter the user name, if you are using a FTP server:

```
Enter username for FTP server or hit return for TFTP server: <userID>
```

Enter the password for the FTP server (if prompted):

```
Enter password for username on FTP server: <password>
```

NOTE: The switch supports three configuration files: active, backup, and factory. See the “Selecting a configuration block” section in the “Boot Options Menu” chapter for information on how to set which configuration file to use upon boot up.

# Operations Menu

## Introduction

Operations-level commands are used for making immediate and temporary changes to switch configuration. The Operations Menu is used for bringing ports temporarily in and out of service. This menu is available only from an administrator and operator login.

## Menu information

Command: `/oper`

```
[Operations Menu]
     port     - Operational Port Menu
     passwd   - Change current user password
     clrlog   - Clear syslog messages
     tnetsshc - Close all telnet/SSH connections
     ntpreq   - Send NTP request
```

The following table describes the Operations Menu options.

Table 122 Operations Menu options

| Command | Description |
|---|---|
| `port <port number>` | Displays the Operational Port Menu. |
| `passwd <1-128 characters>` | Allows the user to change the password. You need to enter the current password in use for validation. |
| `clrlog` | Clears all Syslog messages. This command is available only from an administrator login. |
| `tnetsshc` | Close all telnet/SSH connections. |
| `ntpreq` | Allows the user to send requests to the NTP server. This command is available only from an administrator login. |

## Operations-level port options

Command: `/oper/port <port number>`

```
[Operations Port 1 Menu]
     rmon     - Enable/Disable RMON for port
     ena      - Enable port
     dis      - Disable port
     cur      - Current port state
```

Operations-level port options are used for temporarily disabling or enabling a port.

Table 123 Operations-Level Port Menu options

| Command | Description |
|---|---|
| `rmon disable\|enable` | Enables or disables Remote Monitoring for the port. RMON must be enabled for any RMON configurations to function. |
| `ena` | Temporarily enables the port. The port will be returned to its configured operation mode when the switch is reset. |
| NOTE: This command does not enable a port that has been disabled by an ekeying mismatch error. | |
| `dis` | Temporarily disables the port. The port will be returned to its configured operation mode when the switch is reset. |
| `cur` | Displays the current settings for the port. |

# Boot Options Menu

## Introduction

You must be logged in to the switch as the administrator to use the Boot Options Menu.

The Boot Options Menu provides options for:

- Selecting a switch software image to be used when the switch is next reset.
- Selecting a configuration block to be used when the switch is next reset.
- Downloading or uploading a new software image to the switch via FTP/TFTP.

## Menu information

Command: `/boot`

```
[Boot Options Menu]
       image  - Select software image to use on next boot
       conf   - Select config block to use on next boot
       mode   - Select CLI mode to use on next boot
       prompt - Prompt for selectable boot mode
       gtimg  - Download new software image via FTP/TFTP
       ptimg  - Upload selected software image via FTP/TFTP
       reset  - Reset switch [WARNING: Restarts Spanning Tree]
       cur    - Display current boot options
```

Each of the Boot Options Menu commands is discussed in greater detail in the following sections.

## Updating the switch software image

The switch software image is the executable code running on the switch. A version of the image ships with the switch, and comes pre-installed on the device. As new versions of the image are released, you can upgrade the software running on the switch.

Upgrading the software image on the switch requires the following:

- Loading the new image onto a FTP/TFTP server on your network
- Downloading the new image from the FTP/TFTP server to the switch
- Selecting the new software image to be loaded into switch memory the next time the switch is reset

### Downloading new software to the switch

The switch can store up to two different software images, called image1 and image2, as well as boot software, called boot. When you download new software, you must specify where it should be placed: either into image1, image2, or boot.

By default, the software for the Layer2 switch mode (NormalPanel) is stored in the image1, and the software for the SmartPanel mode is stored in the image2.

To download new software to the switch, you will need the following:

- The image or boot software loaded on a FTP/TFTP server on your network
- The hostname or IP address of the FTP/TFTP server
- The name of the new software image or boot file

NOTE: The DNS parameters must be configured if specifying hostnames. See the “Domain name system configuration” section in the “Configuration Menu” chapter.

NOTE: For the information of SmartPanel, see the SmartPanel Reference Guide.

When the above requirements are met, use the following procedure to download the new software to the switch.

1. At the Boot Options# prompt, enter:

```
Boot Options# gtimg
```

2. Enter the name of the switch software to be replaced:

```
Enter name of switch software image to be replaced
 ["image1"/"image2"/"boot"]: <image>
```

3. Enter the hostname or IP address of the FTP/TFTP server:

```
Enter hostname or IP address of FTP/TFTP server: <server name or IP
address>
```

4. Enter the name of the new software file on the server:

```
Enter name of file on FTP/TFTP server: <filename>
```

   The exact form of the name will vary by FTP/TFTP server. However, the file location is normally relative to the FTP/TFTP directory.

5. Enter the username, if you are using a FTP server:

```
Enter username for FTP server or hit return for TFTP server: <userID>
```

6. Enter the password for the FTP server (if prompted):

```
Enter password for username on FTP server: <password>
```

7. The system prompts you to confirm your request.

   You should next select a software image to run, as described in the “Selecting a Soft Image to Run” section.

8. If you are loading an image from which you are not currently booted, the system prompts you to change the image.

```
image2 currently contains Software Version 1.0.0
 that was downloaded at 15:46:36 Wed Apr 23, 2006.
New download will replace image2 with file "1.0.1_OS.img"
 from TFTP server 192.168.2.4.
Confirm download operation [y/n]: y
Invoking TFTP over port 69...
Starting download...
File appears valid
Download in
progress..................................................
Image download complete (1333953 bytes)
Writing to flash...This takes about 90 seconds. Please wait
Write complete (1333953 bytes), now verifying FLASH...
Verification of new image2 in FLASH successful.
image2 now contains Software Version 1.0.1
Switch is currently set to boot software image1.
Do you want to change that to the new image2? [y/n] y
Next boot will use new software image2.
```

# Selecting a software image to run

You can select which software image (image1 or image2) you want to run in switch memory for the next reboot.

1. At the Boot Options# prompt, enter:

```
Boot Options# image
```

2. Enter the name of the image you want the switch to use upon the next boot. The system informs you of which image is currently set to be loaded at the next reset, and prompts you to enter a new choice:

```
Currently set to use switch software "image1" on next reset.

Specify new image to use on next reset ["image1"/"image2"]:
```

IMPORTANT: When the switch software is changed (NormalPanel or SmartPanel) and the switch is rebooted, the switch configuration is removed and the switch runs factory configuration block. Backup the switch configuration if needed.

# Uploading a software image from the switch

You can upload a software image from the switch to a FTP/TFTP server.

1. At the Boot Options# prompt, enter:

```
Boot Options# ptimg
```

2. The system prompts you for information. Enter the desired image:

```
Enter name of switch software image to be uploaded
["image1"|"image2"|"boot"]: <image>
```

3. Enter the name or the IP address of the FTP/TFTP server:

```
Enter hostname or IP address of FTP/TFTP server: <server name or IP
address>
```

4. Enter the name of the file into which the image will be uploaded on the FTP/TFTP server:

```
Enter name of file on FTP/TFTP server: <filename>
```

5. Enter the user name, if you are using a FTP server:

```
Enter username for FTP server or hit return for TFTP server: <userID>
```

6. Enter the password for the FTP server (if prompted):

```
Enter password for username on FTP server: <password>
```

7. The system then requests confirmation of what you have entered. To have the file uploaded, enter y.

```
image2 currently contains Software Version 1.0.0
Upload will transfer image2 (1889411 bytes) to file "test"
 on TFTP server 192.1.1.1.
Confirm upload operation [y/n]: y
```

# Selecting a configuration block

When you make configuration changes to the switch, you must save the changes so that they are retained beyond the next time the switch is reset. When you execute the save command, your new configuration changes are placed in the active configuration block. The previous configuration is copied into the backup configuration block.

There is also a factory configuration block. This holds the default configuration set by the factory when the switch was manufactured. Under certain circumstances, it may be desirable to reset the switch configuration to the default. This can be useful when a custom-configured switch is moved to a network environment where it will be re-configured for a different purpose.

Use the following procedure to set which configuration block you want the switch to load the next time it is reset:

1. At the Boot Options# prompt, enter:

```
Boot Options# conf
```

2. Enter the name of the configuration block you want the switch to use.

   The system indicates which configuration block is currently set to be loaded at the next reset, and prompts you to enter a new choice:

```
Currently set to use active configuration block on next reset.
Specify new block to use ["active"/"backup"/"factory"]:
```

# Resetting the switch

You can reset the switch to make your software image file and configuration block changes occur.

Resetting the switch causes the Spanning Tree Protocol to restart. This process can be lengthy, depending on the topology of your network.

To reset the switch, at the Boot Options# prompt, enter:

```
>> Boot Options# reset
```

You are prompted to confirm your request.

# Accessing the ISCLI

To access the ISCLI, enter the following command from the AOS CLI, and reset the switch:

```
Boot Options# mode iscli
```

The default command-line interface for this switch is the AOS CLI. To access the AOS CLI, enter the following command and reset this switch:

```
>> Switch# boot cli-mode aos
```

Users can select the CLI mode upon login, if the `/boot/prompt` command is enabled. Only an administrator connected through the console port can view and enable `/boot/prompt`. When `/boot/prompt` is enabled, the first user to log in can select either the CLI mode. Subsequent users must use the selected CLI mode, until all users have logged out.

# Current switch software information

To display the current switch software information, enter the following.

```
>> Boot Options# cur
Currently set to boot software image2, factory default config block.
Current FLASH software:
  image1: version 1.2.0, downloaded  0:15:51 Mon Jan  2, 2006
          NormalPanel
  image2: version 1.0.0, downloaded  1:32:08 Sun Jan  8, 2006
          SmartPanel
  boot kernel: version 1.2.0
```

Use this command to display the image running on the switch, the Configuration block which the switch runs after booted, and the switch software stored in image1 and image2.

When NormalPanel is displayed in the software information, the software for Layer2 switch mode is stored in the image. When SmartPanel is displayed, the software for SmartPanel mode is stored in the image.

# Maintenance Menu

## Introduction

The Maintenance Menu is used for debugging purposes, enabling you to generate a technical support dump of the critical state information in the switch, and to clear entries in the Forwarding Database and the Address Resolution Protocol (ARP) and routing tables. This menu is available only from an administrator and operator login.

## Menu information

Command: `/maint`

```
[Maintenance Menu]
      sys     - System Maintenance Menu
      fdb     - Forwarding Database Manipulation Menu
      debug   - Debugging Menu
      arp     - ARP Cache Manipulation Menu
      igmp    - IGMP Multicast Group Menu
      uudmp   - Uuencode FLASH dump
      ptdmp   - tftp put FLASH dump to tftp server
      cldmp   - Clear FLASH dump
      panic   - Dump state information to FLASH and reboot
      tsdmp   - Tech support dump
      pttsdmp - tftp put tech support dump to tftp server
```

Dump information contains internal switch state data that is written to flash memory on the switch after any one of the following occurs:

- The switch administrator forces a switch panic. The panic option, found in the Maintenance Menu, causes the switch to dump state information to flash memory, and then causes the switch to reboot.
- The switch administrator enters the switch reset key combination (`Ctrl-Shift-6`) on a device that is attached to the console port.
- The switch detects a hardware or software problem that requires a reboot.

The following table describes the Maintenance Menu options.

Table 124 Maintenance Menu options

| Command | Usage |
|---|---|
| `sys` | Displays the System Maintenance Menu. |
| `fdb` | Displays the Forwarding Database Manipulation Menu. |
| `debug` | Displays the Debug Menu. |
| `arp` | Displays the ARP Cache Manipulation Menu. |
| `igmp` | Displays the IGMP Maintenance Menu. |
| `uudmp` | Displays dump information in uuencoded format. |
| `ptdmp` | Saves the system dump information via TFTP. |
| `cldmp` | Clears dump information from flash memory. |
| `panic` | Dumps MP information to flash and reboots. |
| `tsdmp` | Dumps all switch information, statistics, and configuration. |
| `pttsdmp` | Redirects the technical support dump (tsdmp) to an external FTP/TFTP server. |

## System maintenance options

Command: `/maint/sys`

```
[System Maintenance Menu]
      flags   - Set NVRAM flag word
```

The System Maintenance Menu is reserved for use by NEC technical support. The options are used to perform system debugging.

The following table describes the System Maintenance Menu options.

Table 125 System Maintenance Menu options

| Command | Usage |
|---|---|
| `flags <new NVRAM flags word as 0xXXXXXXXX>` | Sets the flags that are used for debugging purposes by NEC technical support. |

## Forwarding Database options

Command: `/maint/fdb`

```
[FDB Manipulation Menu]
      find    - Show a single FDB entry by MAC address
      port    - Show FDB entries for a single port
      vlan    - Show FDB entries for a single VLAN
      dump    - Show all FDB entries
      clear   - Clear entire FDB, then re-add static entries
```

The Forwarding Database (FDB) Manipulation Menu can be used to view information and to delete a MAC address from the Forwarding Database or clear the entire Forwarding Database. This is helpful in identifying problems associated with MAC address learning and packet forwarding decisions.

The following table describes the FDB Manipulation Menu options.

Table 126 FDB Manipulation Menu options

| Command | Usage |
|---|---|
| `find <MAC address> [<1-4095>]` | Displays a single database entry by its MAC address. You are prompted to enter the MAC address of the device. Enter the MAC address using one of the following:<br>• xx:xx:xx:xx:xx:xx format (for example: 08:00:20:12:34:56)<br>• xxxxxxxxxxxx format (for example: 080020123456). |
| `port <port number>` | Displays all FDB entries for a particular port. |
| `vlan <1-4095>` | Displays all FDB entries on a single VLAN. |
| `dump` | Displays all entries in the Forwarding Database. |
| `clear` | Clears the entire Forwarding Database from switch memory, then adds the static entries to the Forwarding Database. |

## Debugging options

Command: `/maint/debug`

```
[Miscellaneous Debug Menu]
      tbuf    - Show MP trace buffer
      snap    - Show MP snap (or post-mortem) trace buffer
      clrcfg  - Clear all flash configs
```

The Miscellaneous Debug Menu displays trace buffer information about events that can be helpful in understanding switch operation. You can view the following information using the Debug Menu:

- Events traced by the management processor (MP)
- Events traced to a buffer area when a reset occurs

If the switch resets for any reason, the management processor (MP) trace buffer is saved into the snap trace buffer area. The output from these commands can be interpreted by NEC technical support.

The following table describes the Miscellaneous Debug Menu options:

Table 127 Miscellaneous Debug Menu options

| Command | Usage |
|---|---|
| `tbuf` | Displays the management processor trace buffer. Header information similar to the following is shown:<br>MP trace buffer at 13:28:15 Fri May 25, 2002; mask: 0x2ffdf748<br>The buffer information is displayed after the header. |
| `snap` | Displays the management processor snap (or post-mortem) trace buffer. This buffer contains information traced at the time that a reset occurred. |
| `clrcfg` | Deletes all flash configuration blocks. The next time the switch is rebooted, it returns to the factory default settings. |

## ARP cache options

Command: `/maint/arp`

```
[Address Resolution Protocol Menu]
      find    - Show a single ARP entry by IP address
      port    - Show ARP entries on a single port
      vlan    - Show ARP entries on a single VLAN
      addr    - Show ARP entries for switch's interfaces
      dump    - Show all ARP entries
      clear   - Clear ARP cache
```

The following table describes the Address Resolution Protocol Menu options:

Table 128 Address Resolution Protocol Menu options

| Command | Usage |
|---|---|
| `find <IP address>` | Shows a single ARP entry by IP address. For example, 192.4.17.35 |
| `port <port number>` | Shows ARP entries on a single port. |
| `vlan <1-4095>` | Shows ARP entries on a single VLAN. |
| `addr` | Shows the list of IP addresses that the switch will respond to for ARP requests. |
| `dump` | Shows all ARP entries. |
| `clear` | Clears the entire ARP list from switch memory. |

NOTE: To display all ARP entries currently held in the switch, or a portion according to one of the options listed on the menu above (find, port, vlan, dump), see the “ARP information” section of the “Information Menu” chapter.

## IGMP Multicast Group options

Command: `/maint/igmp`

```
[IGMP Multicast Group Menu]
     snoop    - IGMP Snooping Menu
     mrouter  - IGMP Multicast Router Port Menu
     clear    - Clear group and mrouter tables
```

The following table describes the IGMP Multicast Group Maintenance Menu options.

Table 129 IGMP Multicast Group Menu options

| Command | Usage |
|---|---|
| `snoop` | Displays the IGMP Snooping maintenance menu. |
| `mrouter` | Displays the IGMP Multicast Router maintenance menu. |
| `clear` | Clears IGMP Multicast data from switch memory. |

## IGMP Snooping options

Command: `/maint/igmp/snoop`

```
[IGMP Multicast Group Menu]
     find     - Show a single group by IP group address
     vlan     - Show groups on a single vlan
     port     - Show groups on a single port
     trunk    - Show groups on a single trunk
     dump     - Show all groups
     clear    - Clear group tables
```

The following table describes the IGMP Snoop Maintenance Menu options.

Table 130 IGMP Snooping Menu options

| Command | Usage |
|---|---|
| `find <IP address>` | Shows a single IGMP Multicast group by IP address. |
| `vlan <1-4094>` | Shows IGMP Multicast groups on a single VLAN. |
| `port <port number>` | Shows IGMP Multicast groups on a single port. |
| `dump` | Shows all IGMP Multicast groups. |
| `clear` | Clears IGMP Multicast data from switch memory. |

## IGMP Mrouter options

Command: `/maint/igmp/mrouter`

```
[IGMP Multicast Routers Menu]
     vlan     - Show all multicast router ports on a single vlan
     dump     - Show all multicast router ports
     clear    - Clear multicast router port table
```

The following table describes the IGMP Multicast Routers Maintenance Menu options.

Table 131 IGMP Multicast Group Menu options

| Command | Usage |
|---|---|
| `vlan <1-4094>` | Shows IGMP Multicast groups on a single VLAN. |
| `dump` | Shows all IGMP Multicast routers. |
| `clear` | Clears IGMP Multicast router data from switch memory. |

## Technical support dump

Command: `/maint/tsdmp`

Use this command to dump all switch information, statistics, and configuration.

If you want to capture dump information to a file, set your communication software on your workstation to capture session data prior to issuing the tsdmp command.

## FTP/TFTP technical support dump put

Command: `/maint/pttsdmp`

Use this command to put (save) the technical support dump to a FTP/TFTP server.

## Uuencode flash dump

Command: `/maint/uudmp`

Using this command, dump information is presented in uuencoded format. This format makes it easy to capture the dump information as a file or a string of characters.

If you want to capture dump information to a file, set your communication software on your workstation to capture session data prior to issuing the uudmp command. This will ensure that you do not lose any information. Once entered, the uudmp command will cause approximately 23,300 lines of data to be displayed on your screen and copied into the file.

Using the uudmp command, dump information can be read multiple times. The command does not cause the information to be updated or cleared from flash memory.

Dump information is not cleared automatically. In order for any subsequent dump information to be written to flash memory, you must manually clear the dump region. For more information on clearing the dump region, see the "Clearing dump information" section later in this chapter.

To access dump information, at the Maintenance# prompt, enter:

```
Maintenance# uudmp
```

The dump information is displayed on your screen and, if you have configured your communication software to do so, captured to a file. If the dump region is empty, the following displays:

```
No FLASH dump available.
```

## FTP/TFTP system dump put

Command: `/maint/ptdmp <server> <filename>`

Use this command to put (save) the system dump to a FTP/TFTP server.

NOTE: If the FTP/TFTP server is running SunOS or the Solaris operating system, the specified ptdmp file must exist prior to executing the ptdmp command, and must be writable (set with proper permission, and not locked by any application). The contents of the specified file will be replaced with the current dump data.

To save dump information via FTP/TFTP, at the Maintenance# prompt, enter:

```
Maintenance#  ptdmp <server> <filename>
```

Type the FTP/TFTP server IP address or hostname as <*server***>**, and the target dump file as <*filename*>.

Enter the user name, if you are using a FTP server:

```
Enter username for FTP server or hit return for TFTP server: <userID>
```

Enter the password for the FTP server (if prompted):

```
Enter password for username on FTP server: <password>
```

## Clearing dump information

Command: `/maint/cldmp`

To clear dump information from flash memory, at the Maintenance# prompt, enter:

```
Maintenance# cldmp
```

The switch clears the dump region of flash memory and displays the following message:

```
FLASH dump region cleared.
```

If the flash dump region is already clear, the switch displays the following message:

```
FLASH dump region is already clear.
```

## Panic command

Command: `/maint/panic`

The panic command causes the switch to immediately dump state information to flash memory and automatically reboot.

To select panic, at the Maintenance# prompt, enter:

```
>> Maintenance# panic
A FLASH dump already exists.
Confirm replacing existing dump and reboot [y/n]:
```

Enter **y** to confirm the command:

```
Confirm dump and reboot [y/n]: y
```

A list of messages is displayed:

```
Starting system dump...done.

Reboot at 11:54:08 Wednesday October 30, 2005...

. . . . . .

. . . . . .

Rebooted because of console PANIC command.

Booting complete
```

# Unscheduled system dumps

If there is an unscheduled system dump to flash memory, the following message is displayed when you log on to the switch:

```
Note: A system dump exists in FLASH. The dump was saved
      at 13:43:22 Wednesday October 30, 2005. Use /maint/uudmp to
      extract the dump for analysis and /maint/cldmp to
      clear the FLASH region. The region must be cleared
      before another dump can be saved.
```